

ROADS AND STREETS



TIMKEN® REVOLUTIONIZES THE ONE-USE ROCK BIT!

A NEW one-use rock bit developed by Timken® offers you special advantages that can't be equalled by any other one-use bit. The new bit has a unique "Spiralock" union—a square socket that spirals slightly as it recedes. Its superiority has been proved under on-the-job conditions.

Made for jobs where bit reconditioning is impractical or undesirable, the one-use "Spiralock" bit is the latest addition to the Timken rock bit line, which includes the famous threaded multi-use bit and threaded carbide insert bit. And Timken is the only company that offers you *all three* types.

For help in selecting the right bit for your job, call on our rock bit engineering service. Write to The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

**Your best bet for the best bit
... for every job**



1
Timken threaded
multi-use
rock bit.



2
Timken threaded
carbide insert
rock bit.



3
Timken one-use
"Spiralock"
rock bit.

1800 YARDS MOVED EVERY 10 HOURS ON A ROAD THAT

runs through a lake...



After discharging material on the lake fill, the Motor Scrapers turned around by backing the rear wheels off the fill and into the muck forced up from the bottom of the lake. At all times they pulled out easily under their own power.

LAPLANT-CHOATE MOTOR SCRAPERS SPEED MINNESOTA ROAD RELOCATION PROJECT...

CHECK WHAT THESE ADVANTAGES CAN MEAN ON YOUR NEXT JOB

- ✓ Speeds up to 21.2 mph
- ✓ Big Capacity — 14 yds. struck — 17.5 yds. heaped
- ✓ Over 16 H.P. per struck yard of capacity
- ✓ Positive Forced Ejection plus High Apron Lift
- ✓ 225 H.P. Buda Diesel
- ✓ 45 H.P. Continental Starting Engine
- ✓ 12 Cu. Ft. Westinghouse Compressor
- ✓ 32 Amp. Autolite Generator
- ✓ Lipé Railway Clutch — 17"
- ✓ Fuller Transmission — 4A112
- ✓ 4-Wheel Timken-Detroit Air Brakes
- ✓ Double Acting Hydraulic Steering

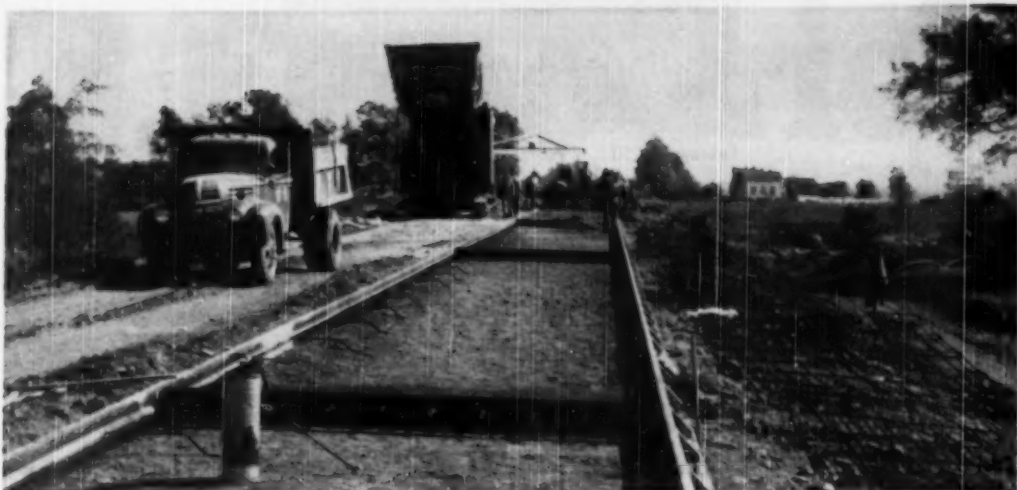
HERE'S the way to lick a tough fill problem. On the road relocation of highway 96 between White Bear and Stillwater, Minn., Kimmes Construction Co. of Hastings used *high speed* earthmoving equipment to move a total of 496,000 yards, including 72,000 yards of rock and earth as fill through the middle of a small lake. Two LPC Motor Scrapers and two C-114 tractor drawn scrapers have moved the bulk of the material, finishing 90% of the project which was scheduled for completion by August 1, 1950. Each Motor Scraper moved an average of 90 yards each hour of a 10-hour shift, on a 6000-ft. cycle.

Like Kimmes Construction Co., you'll find it pays to put powerful, high speed LPC equipment on the job when the going is tough. Get the full story of LPC profit-making advantages from your nearest LPC distributor. LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa—West Coast Branch, 1022 77th Ave., Oakland, Calif.

LAPLANT



CHOATE



Truck waits turn to dump load into skip. Note Bathelhem Dowel Unit and Hook Bolt Dowels in foreground, and Bar Mats at right, ready for placing.



Head-on view of project. Fine graders lead the parade as paving swings into high gear in background. Temporary dirt road is shown at right.



Bathelhem Structural Steel shown in place in new overpass. The structure has one 61-ft, two 42-ft spans. Note railroad tracks beneath steel beams.



Bathelhem H-Piles provide firm footing for overpass. To reach bed-rock, the piles were driven 110 ft. Bathelhem H-Piles have long service life.

New Overpass in Western Pennsylvania



From left to right: J. R. Snyder, contractor; John Legnosky, Pa. Dept. of Highways; B. H. Craig, superintendent; V. C. Minter, bridge foreman.

To eliminate a hazardous grade crossing on the heavily-traveled Linesville-Meadville highway in the western part of the state, the Pennsylvania Department of Highways recently called for a new overpass near Harmonsburg. Construction of this overpass and its two-lane approaches is shown in the accompanying pictures. Contractor: New Castle Duntle Co., New Castle, Pa. Steel items furnished by Bathelhem were bridge reinforcing, structural steel, bar mats, dowel units and guard rail.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bathelhem products are sold by
Bathelhem Pacific Coast Steel Corporation
Export Distributor: Bathelhem Steel Export Corporation

STEEL FOR HIGHWAYS

Dowel Units • Reinforcing Bars • Bar Mats • Guard Rail
Guard Rail Posts • Wire Rope and Strand • Pipe
Hollow Drill Steel • Spikes • Bolts and Nuts
Timber Bridge Hardware • Tie-Rods
Sheet- and H-Piling • Fabricated Structural Steel



ROADS AND STREETS

February, 1950 • Vol. 93 • No. 2

Roads and Streets represents 57 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

E. S. GILLETTE, Publisher



HALBERT P. GILLETTE, Editor-in-Chief

Coming Articles

Diesel Engines

A review of the "diesel revolution" that has occurred in the roadbuilding and construction equipment field in the past 25 years.

Road Maintenance

Major graders, most familiar of all road machines, are far from efficiently used in many quarters. An article or two on their management and operation soon.

Contractor's Shop

and equipment maintenance practice. Several case stories coming.

Bridges

How a viaduct's deck joints were raised for resurfacing . . . How a southern contractor used a rubber-tired paver to pour footings and piers for overpass . . . An eastern viaduct speeded with help of progressive field methods . . . Australian bridge job, where piers were sunk by open caisson 100 ft. through sand.

Highway Legislation

What did the state legislatures do last year? A nation-wide survey.

Fast Earth Moving Jobs of 1949

Several case reports from our popular "Knockin' Out the Yerdage" Department.

Paving and Surfacing

How a California contractor stepped up his resurface footage with an extra bituminous paver, and saved additional time through small towns by paving urban sections after bedtime . . . Texas experience with blacktopping . . . An airport paving job where the contractor cut dummy joints with a concrete saw. Ohio's experience with stone base built with vibratory equipment . . . Iowa's methods of removing lip curb during concrete road resurfacing.

Contractors and the superintendents . . . officials and engineers . . . something for all in each issue of "Roads and Streets". Watch for your next copy. Practical "how it was done" articles invited from readers.

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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B.F. Goodrich



Universal all-nylon for jobs where traction is problem. Note 2-way tread, bulky wedge-shaped cleats.



These Rock Lagger all-nylons were on a truck in extremely tough service for 2 years . . . are still going strong!

ALL-NYLON

tires give full service with no bruise or flex failures

THE B. F. Goodrich ALL-NYLON tire is now in use—and proving successful—on construction jobs and in other off-the-road operations throughout the country. The record speaks for itself: *no blowouts, no bruise breaks, no flex breaks . . .* and that includes severe operating conditions in mines where flex and bruise failures formerly were common. Now, all-nylon tires are giving operators full service with no bruise or flex breaks.

Along with nylon, B. F. Goodrich uses weltless construction. This means there are no cross-threads to hamper cord action and allow some cords to stretch out. Therefore, tire growth is reduced; tires last longer.

Nylon tires always provide big savings for contractors on jobs where heavy loads and rough terrain have made tire costs high.

The new, all-nylon construction is typical of the continuous improvements being made in truck tires by B. F. Goodrich. Long ago, BFG engineers developed special types of tires for off-the-road service. They constantly developed new improvements. One of these was the nylon shock shield, a major construction advancement now used in all B. F. Goodrich truck tires with 8 or more plies (double nylon shock shield in large, off-the-road tires).

For more information on the way

B. F. Goodrich tires can do more work and save you money, see your BFG dealer or write us direct. The B. F. Goodrich Company, Akron, Ohio.



LOW PRICE
Low Operating
Cost
Low Maintenance

3 NEW CEDARAPIDS

...ready now

HIGH CRUSHING AND SCREENING EFFICIENCY GOOD PRODUCTION • 100% PORTABLE

THREE new *low priced* crushing and screening plants added to the complete Cedarapids line is good news for your 1950 budget. Now you can get true Cedarapids quality for a low capital investment—the *better* value that results from Cedarapids volume production of a complete size range of aggregate producing equipment. These three new plants, specifically designed for moderate sized jobs, are quality built throughout for all the crushing and screening efficiency of the big capacity plants. Manufacturing economies resulting from simplified design and volume production are passed on to you in lower first cost. Good capacity, low operating and maintenance costs, and long service life are the economical answer to your aggregate producing problems. Write for full details, specifications and prices.

IOWA MANUFACTURING COMPANY • Cedar Rapids, Iowa, U.S.A.

THE NEW SINGLE- PASS

A low priced, simple, heavy duty unit for producing low cost crushed gravel and rock in one pass. Recommended for jobs where the material is screened down only one size, the Single-Pass is ideal for road maintenance work, jobs in locations that are inaccessible to heavier types of equipment and where portability and fast setup are important. High mobility permits inexpensive moving to gravel pits close to the road, resulting in low hauling costs. Extremely low plant maintenance and operating costs are made possible by Cedarapids' high quality construction, simple design and the few moving parts. Four sizes are available with either plain or roller bearing crushers: 1810, 1920, or 1936, or 1216 twin jaw. Bulletin 552-A gives complete information.

Cedarapids
 Built by
 IOWA

THE IOWA LINE of Material Handling Equipment Includes:

- ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FEEDERS • TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE AND GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • HAMMERMILLS • DRAG SCRAPER TANKS • WASHING PLANTS • SOIL COMPACTION UNITS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS

PORTABLE CRUSHING PLANTS

for 1950!

THE
NEW
ROCK-IT

Portable-day performance in one machine! This high capacity crushing and screening unit will do one thing, do the work of two single crushing units, and at least cost. It crushes "lumps" or hard lumps of rock with an output of 40 to 50 t.p.h. of 50% minus 10" and 20% plus 10" or 1" of fines. Screen crushing from 10" down to 1/2" or 1/4" is available in one operation with one operator. The famous Cedar Rapids horizontal "Kittling" screen provides extremely accurate production. Quickly set up, the ROCK-IT can be moved around the pit without the usual hauling. Low first cost and low operating and maintenance costs increase profit. Being available in three sizes — Model 20 with the 20" Hammermill, Model 30 with the 30" mill, and Model 40 with the 40" mill, crushing. All have 14' x 25' primary crushers. Get full details for Bulletin R-10-1.



THE
NEW
HAWKEYE
SERIES

Low first cost, simple operation and low maintenance mean better roads at lower cost per mile. Producing from 30 to 75 t.p.h., the Hawkeye plant moves with the job to the source gravel bank, saving the cost of long hauls. This sturdy, lightweight plant is 100% portable for easy access to out-of-the-way locations and can be taken over almost any roads and bridges. Extremely low operating costs are made possible by the simple design and use of Cedarapids high quality equipment throughout. The large capacity screen and crusher handle a wide variety of conditions, and produce screened sand as well as accurately sized road gravel. With a Cedarapids Hawkeye on the job, fine, average gravel can be crushed at lower cost per ton, with savings on maintenance, hauling costs, eliminating all run boulders and oversize cobbles from the roadway. Four sizes available, with 1054, 1050 or 1024 roller plate or roller bearing crusher or a 1210 twin jaw roller bearing crusher. It's a complete plant with closed circuit and is a low priced. Write for Bulletin HAW-10-1.



IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.

CHAMPION of

Contractors and Operators throughout the Country Proclaim the New TD-24 CHAMPION of Crawlers

The International TD-24 has proved itself CHAMPION of Crawlers. On job after job, the new TD-24 has won the admiration of operators for the ease with which it does work which other tractors cannot do. Contractor-owners are equally enthusiastic, for they see the TD-24 outworking and out-producing every other tractor in the field.

Greater power, and the weight and traction to match, plus new operator convenience and ease of control, give the TD-24 much more than an edge over any other tractor you might name.

Experienced operators and owners have this to say about the new TD-24: (names on request)

"In my estimation the TD-24 is the heavyweight champion of crawler tractors."

"The TD-24 works right along on slopes so steep we have to cut them down before other tractors can even navigate unloaded. TD-24's are fast tractors, easy to shift and have plenty of power. This combination really moves dirt . . . made us more money than any other tractor could."

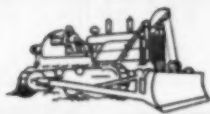
"The TD-24 is a wonderful piece of machinery and I can't say enough for it. Our operators feel they are wasting their time when they run other tractors, for no other tractor built can compare with the work these TD-24's can do."

Visit your International Industrial Power Distributor and see what the TD-24 can do for you. You'll agree it's the CHAMPION of Crawlers—the one tractor you can't afford to be without, for profitable earthmoving.

INTERNATIONAL HARVESTER COMPANY
Chicago

JOE FOREMAN REPORTS SAVINGS

"It [the TD-24] is definitely outhauling every other tractor on the job," says the foreman on this 247,000-yard stadium bowl job in Maryland. "It will do so much work that we are sure our job costs will show a great saving."



Crawlers

"Worth Two of Any Other Heavy Tractor," says Lindsey Belville, president of Greasy Ridge Coal Co., Greasy Ridge, Ohio, strip mine. "This is the best tractor I've ever used in my five years experience," says Warren Bore, the tractor operator shown working it in heavy rock. "It is the only one that will do everything I want it to," he claims.



Performance
on Power
and Fuel



INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



21 Smart ideas

ONLY FORD GIVES YOU A CHOICE OF V-8 OR SIX

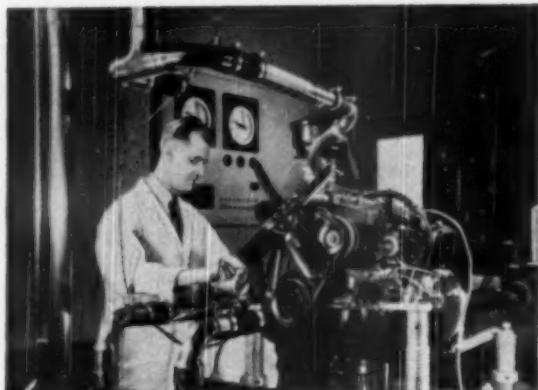
The Ford Truck line for 1950 gives you new models, new ratings, new power, new features—21 smart ideas in all, to help cut trucking costs.

NEW MODELS like the F-3 Parcel Delivery, which expand the 1950 Ford Truck line to over 175 models. This wide selection means that you should see your Ford dealer for the right truck for you, no matter what you haul. New G.V.W. rating increase on Series F-6 and F-8.

NEW POWER like the brand-new 6-cylinder Rouge 254 truck engine. Thus, for 1950 you have a choice of four great engines, two Sixes, and the only two V-8's in trucking. Only Ford gives you a choice of V-8 or Six.

NEW FEATURES like the full air brakes now available on the 1950 F-8 Big Jobs... single-speed axles for the F-6 and F-8... new Synchro-Silent transmissions... new features that make driving safer and easier.

New models! New ratings! New power! New features! You'll find all these smart ideas in Ford Trucks for 1950. And you'll find the smartest idea of them all... Bonus Built construction which means big reserves of strength and power. That's why a 1950 Ford Truck is the smart buy for you. Your Ford Dealer can arrange quick delivery on most models. See him today!



★**NEW 110-HORSEPOWER SIX!** The new Rouge 254 makes the 1950 Ford F-6 the most powerful 6-cylinder Ford Truck ever built. The thoroughly proved 254 has Free-Turn exhaust valves, Autothermic pistons, chrome-plated top piston ring, High-Lift camshaft, and many other power-producing, cost-saving, smart ideas. ★A brand-new, 4-speed Synchro-Silent transmission engineered for quiet operation, easy shifting and long life is standard with the new 254 engine.



Model F-2; 3,700 lbs. G.V.W.
Express or Stake



Model F-1; 4,700 lbs. G.V.W.
Panel, Pickup or Stake



Model F-3; 4,000 lbs. G.V.W.
Express or Stake



Model F-5; 14,000 lbs. G.V.W.
Wheelbases: 134, 158 and 176 in.



Model F-4; 10,000 lbs. G.V.W.
with Dumps



Model F-3 Parcel Delivery
Wheelbases: 104 and 123 in.

America's No. 1 Truck Value!

No. 1 in sales gains. Registration figures show Ford Trucks are scoring bigger sales gains than all other makes combined, based on the latest three months of 1949!

No. 1 in choice of engine types. Only Ford gives you a choice of V-8 or six-cylinder engine design.

No. 1 in experience. Latest registrations prove that 2,003,133 Ford Trucks on the road have marked up 18,567,863 truck years of experience... a record equaled by no other truck.

No. 1 in long life. Using latest registration data on 4,106,000 trucks, life insurance experts prove Ford Trucks last longer.

No. 1 in value. Over 175 models! The only V-8's in trucking! Two 145-h.p. Big Jobs rated up to 39,000 lbs. They're Bonus Built which means big reserves of strength and power.

Ford Trucks Cost Less Because—

for 1950!*

-IN A FULL LINE OF OVER 175 TRUCK MODELS!



***NEW F-7 REAR BRAKES!** Big 15" x 5" hydraulic, dual cylinder. High torque self-centering action both forward and reverse.



***NEW AIR BRAKES** available on the Ford Series F-8 Big Job combine smooth flexibility with immediate, positive action.



***NEW WHEELBASES!** Three of them for 1950 Ford Trucks. Series F-5 and F-6 now have a 176-in. wheelbase for bodies in the 15-ft. range. The 145-horsepower Ford Big Jobs have added two new wheelbases to get a total of five. First, a 147-in. wheelbase for tractors and dump trucks. Second, a 178-in. wheelbase for 15-ft. bodies.



***NEW PARCEL DELIVERY!** Forward control chassis with grille, windshield and quarter-windows. You add your choice of bodies. Available in Series F-3 and F-5 (Special order).

* New single-speed rear axle for F-8 * New extra-heavy duty clutch with 254 engine * Million Dollar Cab * Air Wing door glass ventilators * Level Action cab mounting * New Double Channel frame for Big Jobs * Gyro-Grip Clutches * New single-speed axle for F-6 * Roll Action Steering * New extra H. D. drive line with 254 engine * Quadrax rear axles * 4 engines—choice of V-8 or Six * New heavy duty, 3-speed Synchro-Silent transmission available for F-1 thru F-3 * Choice of over 175 models * Bonus Built construction.



One of many 145-horsepower Ford F-8 Trucks operated by Michigan Motor Freight Lines, Inc. of Detroit, Mich.



Model F-5 Cab-Over-Engine
14,000 lbs. G.V.W.



Model F-5 School Bus Chassis
Wheelbases: 158 and 194 in.



Model F-6 Cab-Over-Engine
16,000 lbs. G.V.W.



Model F-6: 16,000 lbs. G.V.W.
Wheelbases: 134, 158 and 176 in.



Model F-7: 19,000 lbs. G.V.W.
35,000 lbs. G.T.W.



Model F-8: 22,000 lbs. G.V.W.
39,000 lbs. G.T.W.

FORD TRUCKS LAST LONGER

Using latest registration data on 6,106,000 trucks, life insurance experts prove Ford trucks last longer!

When writing advertisers please mention **ROADS AND STREETS**, February, 1950

Increase your CENTRAL-MIX PLANT earnings

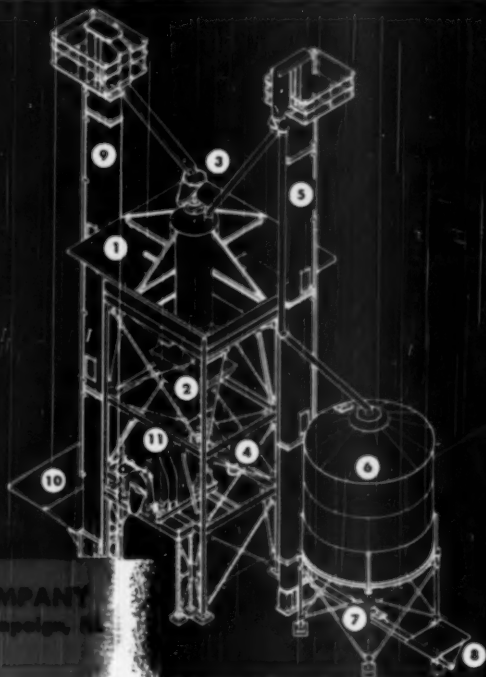


JOHNSON CENTRAL-MIX PLANT GIVES YOU ACCURATE CONTROL ... LOW-COST PRODUCTION:

- 1 This 120 cu. yd. Step-by-Step Bin is arranged for 4 aggregate compartments of 25 cu. yds. each, and has a centrally-located cement tank of 110 bbls. capacity.
- 2 Concentric aggregate and cement batcher, of 2 cu. yd. capacity, handles all 4 aggregates and the cement. (See photo on opposite page.)
- 3 Pivoted distributor, mounted at top of bin, feeds aggregates into any of the 4 compartments.
- 4 Charging chute can load dry-batch mix direct into trucks.
- 5 Cement bucket elevator has capacity of 300 bbl. per hour.
- 6 Single-compartment storage silo holds 945 bbls. of cement.
- 7 Screw-type cement conveyor has approximately 300 bbl. per hour capacity.
- 8 Hopper for receiving bag cement.
- 9 Aggregate bucket elevator.
- 10 Hopper for receiving aggregates from trucks.
- 11 Heavy-duty, non-tilting Koshing mixer, model 36-S, for accurate quality and high-speed mixing.

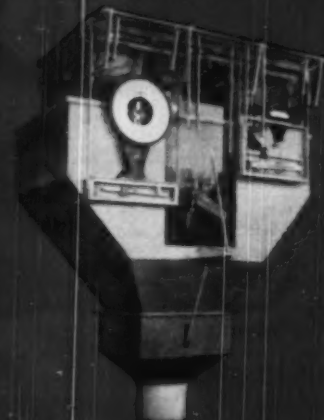
TO PROVIDE you with the most economical production of concrete, Johnson offers you today's widest selection of portable and stationary plants, all types, sizes and styles . . . engineered to your exact requirements. One typical example is the flexible Johnson Central-Mix plant illustrated here with Step-by-Step Bin. Also available are Johnson Octa-Bin plants that can be used with as many as 8 aggregate compartments, 150 to 3,000 yds. overhead storage, and 150 to 1350 bbl. capacities in central cement tank. Ask too, about Johnson Portable-Section, Welded Aggregate and Cement Bins for crane, elevator or conveyor charging.

Over 100,000,000 cu. yds. of concrete have been poured by Johnson-engineered Central-Mix Plants. This practical experience can save you time, money and increase your profits. Whenever you are ready to modernize your present plant or plan for new Central-Mix, Transit-Mix or Concrete Products facilities, it will pay you to write us, or call your local Johnson distributor.



C.S. JOHNSON COMPANY
Chicago, Ill.
(Koshing Subsidiary)

with JOHNSON



CONCENTRIC BATCHER

Prevents Cement Loss

Johnson's Johnson Concentric Batcher prevents cement loss by preventing the cement from "bridging" in the hopper. It also prevents the cement from "bridging" in the hopper. It also prevents the cement from "bridging" in the hopper. It also prevents the cement from "bridging" in the hopper.



WATER BATCHERS

Improve Concrete Quality

Here's another handy auxiliary unit that can help increase your mix plant efficiency — Johnson Water Weigh-Batchers. Capacities: 120 gallons or 1,000 lbs. for batches up to 2 yards, and 240 gallons or 2,000 lbs. for batches up to 5 yards. Semi- and full-automatic types. They're fast-weighing — accuracy is not affected by changes in water temperatures.

HIGH-SPEED, RUBBER-TIRED TRENCHMOBILE

Gives you 18.9 m.p.h. job-to-job speeds . . . digs 14.65 ft. per min., up to 4 ft. deep, 5" and 8" wide . . . provides fast new method of handling off-street connections and other small trenching jobs. Ask your local Parsons distributor about this mobile, utility-size Model 80 Trenchmobile . . . or write us direct about the savings it offers on your work.



PARSONS

2101 N. W. Hwy.
Horton, Iowa

LOW-COST, FULLY-POWERED MOTO-BUG

On your wheelbarrow work, there's no pushing . . . no pulling with Kwik-Mix fully-powered Moto-Bug. Travels 1½ to 4 m.p.h., forward and reverse. Has positive, direct steer; standard make 4 h. p. air-cooled gasoline engine; 10 cu. ft. bucket; controlled gravity dump. 1200 lb. capacity flat-bed platform, and operator riding step also available.



KWIK-MIX

2101 N. W. Hwy.
Horton, Iowa

HEAVY-DUTY HALF-YARD KOEHRING 205

For top performance in the ½-yd. excavator class, check Koehring 205's independent traction, self-adjusting main clutches, simple, heavy-duty construction . . . quick convertibility from ½-yd. shovel or pull shovel to 7¼-ton crane, clamshell, dragline, on crawlers or rubber-tires. See your Koehring distributor, or send for big 28-page catalog.



KOEHRING

COMPANY
Allentown, Pa.

Symons Cone Crushers

SYMONS Cone Crushers and Symons Vibrating Screens, proven throughout the world in the most efficient stationary rock, ore and mineral processing plants, are being used in increasing numbers by successful operators of Portable and Semi-Portable Plants. Here are a few of the ever growing number of installations of Symons units in Portable and Semi-Portable materials producing plants.

The wide range of sizes and types of Symons equipment makes possible their use singly or assembled in combinations to fit your most exacting needs for producing greater tonnage of quality aggregate at lowest cost.

Whether you are a contractor, operator, high-

way construction engineer (municipal, county, state or Federal government), designer or manufacturer of Portable and Semi-Portable Plants, it will pay you to specify and use Symons machinery.

A series of suggested plant arrangements has been assembled into a new engineering brochure offering a wealth of information about the use of Symons Cone Crushers and Symons Vibrating Screens in Portable and Semi-Portable Plants. This brochure is especially valuable to *aggregate producers who are considering building their own plants, and to portable plant manufacturers.* It contains numerous drawings of single and multiple-stage plants, specifications, capacity charts, unit sizes, power requirements, conveyor sizes and other profitable information. Available free — no obligation. Send for your copy today!

NORDBERG MFG. CO. MILWAUKEE 7, WISCONSIN

New York • San Francisco • Washington • Spokane
Mexico, D.F. • London • Toronto • Johannesburg



Symons Cone Crusher with conveyor and screens mounted on a trailer—used by well-known quarry, Oregon.

Symons Vibrating Screen—used in a complete screening and sorting plant built by a prominent manufacturer of portable plants.

NORDBERG

*Machinery for processing
ores and
industrial minerals*



Stationary and Jaw Crushers



Jaw Crusher



Vibrating Bar Grizzly

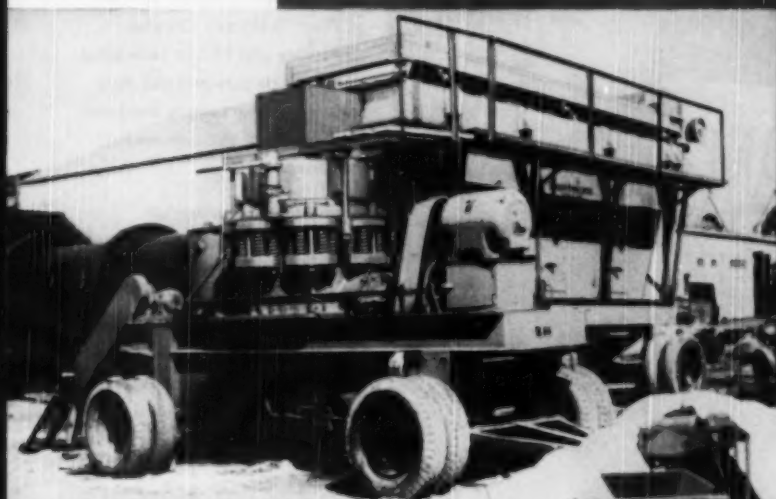


Symons Screen for Hot Plants



Diesel Engine

IN PORTABLE AND SEMI-PORTABLE PLANTS



Symons 3-4 Standard Cone Crusher and 4' x 10' double deck screen Vibrating Screen, electric drive, shock-mounted, aggregate plant — Local built — Standard Mining Company, Ontario, Canada.

Symons 4-6 1/2 Standard Cone Crusher, electric drive, shock-mounted, aggregate plant — Local built — Canyon Construction Co., Caldwell, Idaho.



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OLIVER 750 Industrial



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OLIVER-Cletrac Model 100



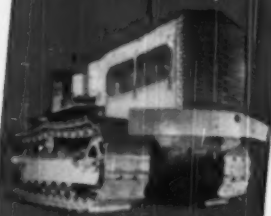
OLIVER-Cletrac Model 110



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● From the complete line of Oliver "Cletrac" Crawler Tractors and Oliver Industrial Wheel Tractors you can pick exactly the tractor you need and be assured of performance *in advance.*

The finest in industrial machinery is more than a slogan to Oliver . . . it is an accomplished fact that has been proved in year after year of outstanding performance. Design, materials, workmanship, and plant equipment are all based on one standard . . . the built-in dependability that adds up to more years of service in the field . . . lower operating and maintenance costs to you.

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flashing action

STOPS 'EM



**Keystone Flashing Lights
provide it two ways at once . . .**

Flashing action in a warning light is seen and obeyed. These Keystone Lights flash 80 "STOP" warnings per minute to both front and rear. They do the work of two or more lights at the cost of one. This means safety for your men—your vehicles—and the taxpayers—at a small investment. For over 12 years, Keystone Flashing Lights have been used by nearly all state highway departments and countless cities, counties, townships, park and highway commissions, and public utilities, on all types of vehicles. Request sample light—sent without obligation.

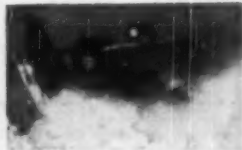
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Heavy duty lights that won't shake apart. Water can't get in and short them. Mounted anywhere on vehicle. Supplied with 10 1/2 inch red lenses lettered "STOP" or with plain red, amber or blue lenses for 8 and 12 volt systems.

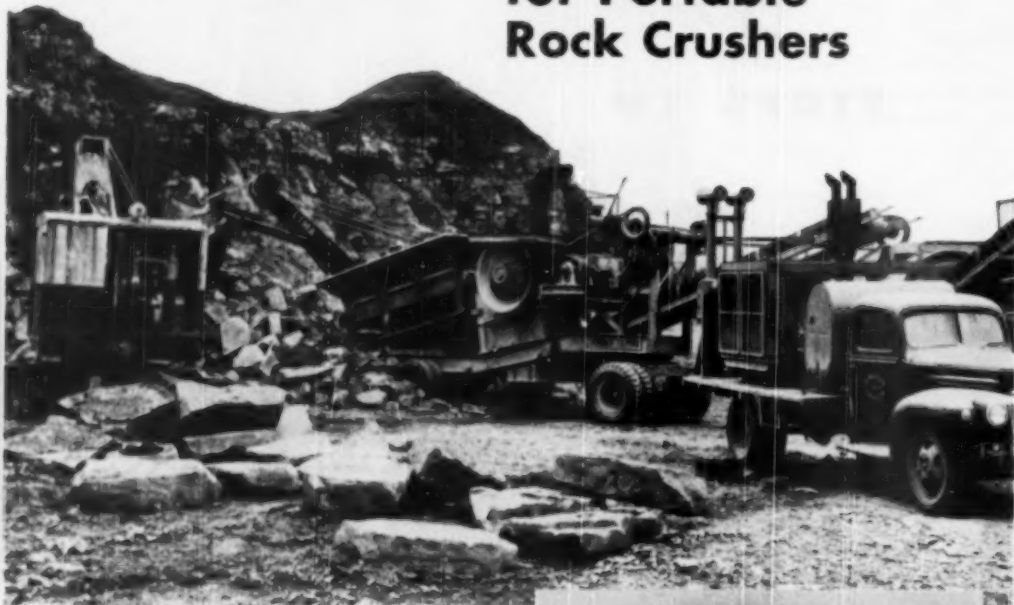
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Best Power there is

for Portable Rock Crushers



THAT'S what hundreds of operators like B. L. Anderson of Cedar Rapids, Iowa, are saying about General Motors Series 71 Diesels—and with good reasons.

GM Diesels pack lots of rugged power, yet their sensible size and weight make them easy to move and simple to set up. Efficient factory-built multiple engine units are available. Virtually every power need can be filled.

ALL GM Diesels are 2-cycle, with power at every piston downstroke. They're smooth-operating—easy to start on their own fuel—and quick to respond when picking up a load.

A truck-mounted GM Diesel Twin Six drives the 40" hammermill, a single six powers the 90" x 36" jaw crusher on this Cedar Rapids portable unit, one of two GM Diesel-powered plants operated by B. L. Anderson in eastern Iowa. Each plant averages 130 tons of ¾" road rock per hour. Operating 18 GM Diesel engines in various pieces of equipment, Anderson has lost only one day's operation in three years due to engine failure.

These qualities are important in any rock-crushing operation. So it's certainly worth while to get full information on these hard-working, easy-to-maintain 2-cycle Diesels. Drop us a line and we'll see that you get it.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 200 H. P.

DETROIT 26, MICHIGAN

MULTIPLE UNITS... Up to 900 H. P.

GENERAL MOTORS



DIESEL BRAVN WITHOUT THE BULK

MARION 362

All-Purpose $1\frac{1}{2}$ Cu. Yd.
machine with a

PROVEN RECORD
of outstanding performance



SOME MARION 362 FEATURES

VERSATILE — Easily convertible front-end equipment for shovel, dragline, clamshell, crane, pull shovel, drop ball and grapple service. Conversions made quickly in field. No machinery changes except for drum luggings and sprockets.

SMOOTH CLUTCHES — Smooth, positive clutch action over the years. Swing, propel and crowd retract clutches never require adjustment; hoist and crowdout clutches have only one adjustment.

MARION AIR CONTROL — Compensating-type air control valves yield full machine power when 12 pounds of pressure is applied to control levers. No production lag because of operator fatigue. Air control eliminates levers, bell crank, toggles, pins, etc.

ANTI-FRICTION BEARINGS — 16 ball or roller bearings cover all principal friction points, resulting in greater operating economy, machine efficiency and fewer replacements.

SIMPLE, HEAVY-DUTY DESIGN — Only two horizontal shafts on machinery deck. Only 16 gears aside from front end equipment. Gears heat treated. Shafting of alloy steel. Main frame all welded for life-long perfect alignment.



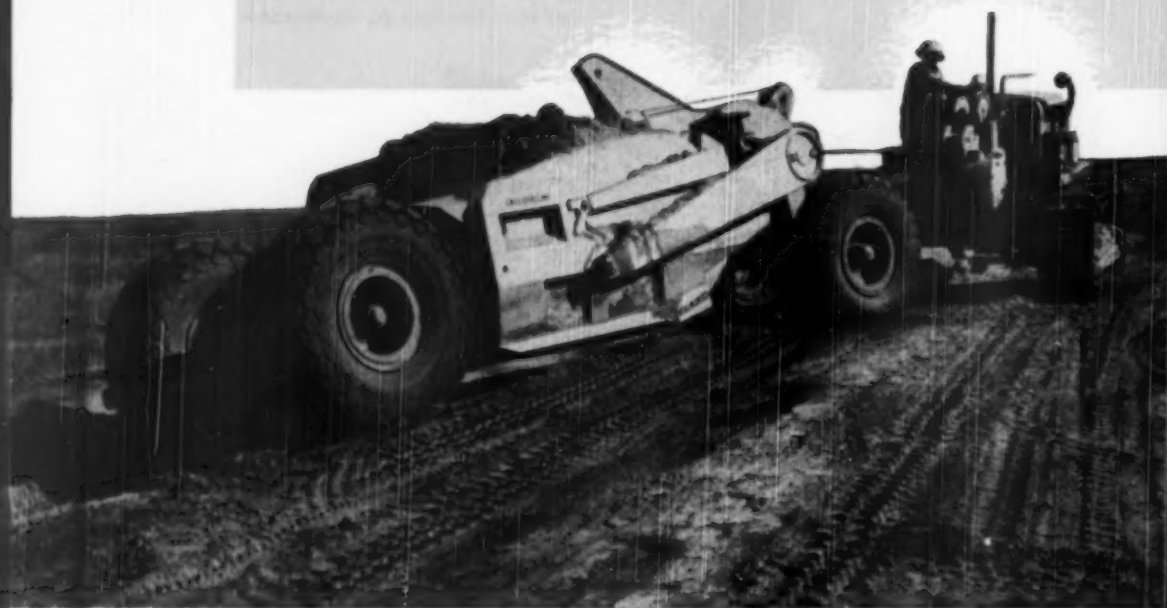
MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

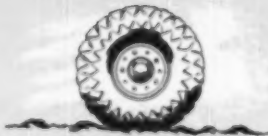
Offices and Warehouses in all Principal Cities

BOOST PRODUCTION



EASY LOADING

Blade angle and design are two points that contribute to good or bad loading characteristics. The tough "Caterpillar" blade is set to shear hard-to-dig material, then direct and guide it into the loading chute. With 3 inches of special hard facing alloy deposited on these cutting edges, the user is assured of a blade that sharpens to a keen edge.



BIG TIRES . . . MORE TRIPS

When ground conditions deteriorate, air pressures are usually reduced to keep tire penetration at a minimum. The big and oversize tires used on "Caterpillar" Scrapers are able to have their pressures greatly reduced without overloading. That means they stay on top, roll more easily, allow hauling in higher gears and aid in piling up real yardage records.



'DOZER-TYPE EJECTION

'Dozer-type ejection rolls sticky clay out of the bowl with ease and precision. Typical of "Caterpillar" finely engineered design are the ejector plate guide rollers. These heat-treated rollers are mounted on adjustable eccentric shafts so that proper clearance may always be maintained between bowl sides and ejector plate. Binding or rubbing problems are eliminated.

CATERPILLAR

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS

AND CUT COSTS

with
"CATERPILLAR"
SCRAPERS

WHEN the chips are down, you can count on a husky "Caterpillar" Scraper to come through for you. Stamina is built into every inch of its hide to stand terrific punishment. Its finely engineered design enables it to speed through jobs that slow down ordinary units. Pair it with its matching "Caterpillar" Diesel Tractor, and you've got a team that saves you money two ways—in higher production and lower maintenance costs.

Pictured here is a "Caterpillar" No. 80 Scraper rated at 18 heaped yards with its matching D8. Owned by Eau Claire County,

Wisconsin, this team pays dividends every pay load. Making a trip every 7½ minutes on an 1800-foot round-trip haul, its average production is about 800 bank measure cubic yards per 8-hour day.

You can't talk quality into a machine. You've got to build it in—take a look at the "Caterpillar" Scraper's features and you'll see why this big yellow slugger really rates with men who know earthmoving. Better still, call your nearby "Caterpillar" dealer today for information and a demonstration!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



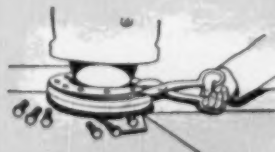
GOOD APRON DESIGN

"The sky is the limit" when raising the aprons on "Caterpillar" Scrapers. Open-top scraper design combined with long apron arms located outside the bowl assure the free ejection of heaping sticky loads. When ejecting fine materials such as sand, the maximum apron height can be reduced to provide a smooth spread with no gaps.



ENGINEERED CABLE SYSTEM

The entire "Caterpillar" cable control system is finely engineered to give constant easy performance. Accurately aligned heat-treated sheaves prevent cable chafing and minimize power drain on the tractor engine. All cables are shielded against abrasive materials, yet one man can easily thread the entire unit while keeping both feet on the ground.



LOW MAINTENANCE COST

Typical of "Caterpillar" in-built quality is the ball and socket joint connecting gooseneck to front axle. The ball is induction hardened with a tough center to withstand both wear and breakage. Spherical design enables the scraper to be maneuvered into extreme positions without binding. Shims are removed as wear occurs and a bronze liner rides between ball and socket to prevent steel-to-steel contact. Lubrication is through a single Zerk fitting.

DIESEL

EARTHMOVING EQUIPMENT



CATERPILLAR TRACTOR CO.

Box RS-2, Peoria, Illinois

Send me, without obligation, booklet,
"Caterpillar" Scrapers Are Profit Makers."

Name _____

Address _____

ALL-STAR PERFORMANCE

ON 1001 JOBS

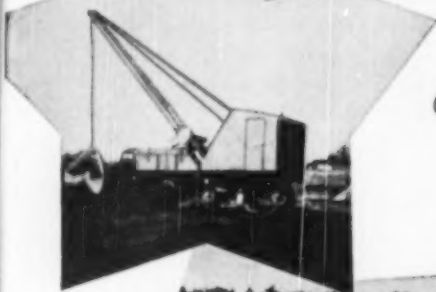
LOADING FROM STOCKPILE



PILEDIVING IN CLOSE QUARTERS



CLAMSHELL ON HALF-TRACKS



6 Profit-Makers in One Machine

The $\frac{1}{3}$ Yard Schield Bantam is designed for rapid conversion from shovel to trench hoe, dragline, clam, pile-driver, or crane. It's a time-saving money-maker on a wide variety of jobs all year around. Mounts on any $1\frac{1}{2}$ -ton truck chassis — drives up to the job and digs in.

High strength alloy construction throughout with big machine features that mean longer life, freedom from expensive breakdowns, and ease and economy of operation . . . all major assemblies roll on ball bearings . . . modern hook roller design . . . bull gear protected from dirt and grit . . . smooth operating mechanical clutches . . . full circle design . . . fast cycle operation.

For all-star performance get BANTAM dependability, versatility, mobility, and soundness of design.

NORMAL CAPACITY { Shovel or Dragline - 60 to 80 yards
PER HOUR { Trench Hoe - 100 feet of 3-ft ditch

WRITE FOR COMPLETE DETAILS

The SCHIELD BANTAM CO., Inc.
203 PARK STREET WAVERLY, IOWA

DIGGING WITH TRENCH HOE



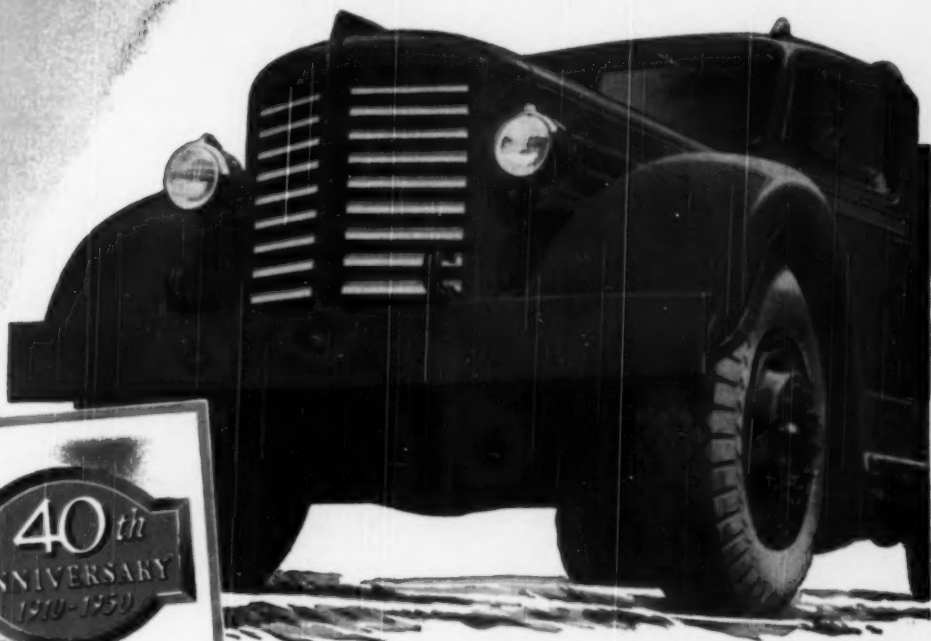
Sold and serviced by leading construction machinery distributors throughout the United States, Canada, and Foreign Countries

THE $\frac{1}{3}$ YARD SCHIELD BANTAM

TRUCK MOUNTED TRENCH HOE
SHOVEL • CLAM • DRAGLINE
PILEDRIIVER • CRANE

FEDERAL Trucks

POWERED for Profit-Plus PAYLOADS



"This year marks Federal's 40th Anniversary as an exclusive manufacturer of motor trucks. Every vehicle that rolls off our assembly lines reflects the creative engineering development of these many years. We believe that the thousands of Federals in daily use all over the world offer conclusive proof of a job well done."

G. H. Hammond,
President

FEDERAL'S BALANCED DESIGN MATCHES ANY HAULING JOB

There's a reason for Federal Truck's enviable record of satisfactory performance. It's all-truck construction from front to rear that makes this reputation for economy, low maintenance cost and long service possible. Since 1910 Federal has built motor trucks exclusively. Federal engineers know what you operators need to meet today's hauling demands. So, put Federal Trucks to work for you—you'll see what Federal owners mean when they say, "Toss the Tough Jobs to Federal."

FEDERAL MOTOR TRUCK COMPANY • Detroit 9, Mich., U.S.A.

Federals Have Won . . . By Costing Less to Run

49 MODELS

**34 TO 35 TONS
INCLUDING A
COMPLETE LINE
OF 6-WHEELERS**

TEAR OFF THIS COUPON AND MAIL TODAY!

Please send me details on Federal Trucks of _____ tons
capacity for _____ use.

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**FEDERAL
TRUCKS**

Since 1910

"C" **TOURNAPULL.**

gives you year-round **PROFITS**



C Tournapull prime mover,
190 h.p. diesel. 4 speeds to
30 m.p.h. 21.00 x 25 low
pressure tires. power steer, 90°
turns. electric controls.
uses 4-wheel multi-disc air brakes.
loading surface 4,176 sq. in.

No other dirtmover can offer you the opportunities for steady earnings that come to you with C Tournapull. Behind this high-speed, rubber-tired prime mover you can interchange at will six different types of money-making equipment to fit the time, the season, and your own profit opportunities. Each fits specific needs for earning extra profits on your own jobs, for good pay on sub-contracts, or for high-rate rentals.

Note that each of these auxiliary interchangeable units is a simple, rugged, specialized tool for doing certain types of work at a far lower cost than is customary with general purpose equipment. When you buy any one combination with the C Tournapull prime mover you get with it an extra value in insurance, steady and profitable earnings, because of its great versatility of application with other hauled units.



To: R. G. LeTOURNEAU, INC., Peoria, Illinois

Please send information on C Tournapull prime mover for work with:

☐ Scraper ☐ Rear-dump hauler ☐ Bottom-dump hauler ☐ Flat bed ☐ Crane ☐ Concrete Mixer

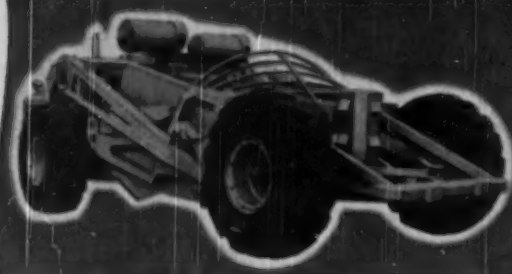
NAME..... TITLE.....

COMPANY..... TYPE OF BUSINESS.....

STREET..... CITY, STATE.....

If you have work to subcontract for any of tools shown, please describe fully in letter and we will have your local LeTourneau Distributor put you in touch with nearest owner equipped to handle your work.

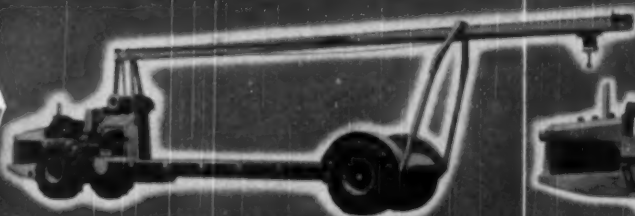
interchangeability



TOURNAPULL . . . C Roadster loads 13.5 cubic yards (capacity 16 tons). In any kind of scraper dirt on either long or short hauls, will beat all previous LeTourneau Scrapers in this size range for both output-per-day and cost-per-yard. Optional hauled units, bought as needed, cost \$4500 to \$7400, prime mover change takes only a few hours.



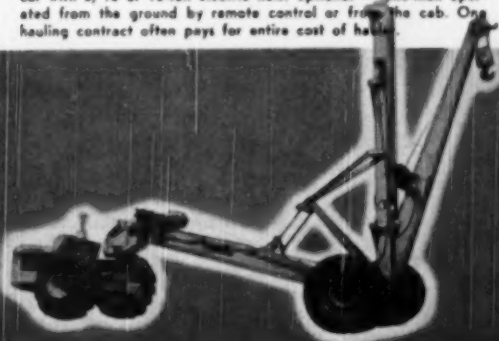
TOURNAROCKER . . . a revolutionary new rear-dump haul unit for use under shovel, dragline, conveyor or other loading equipment. Capacity 16 tons or 16.5 yards heaped. Big shovel target, 7' 10 1/2" x 11' 3" . . . 15' 11" wheelbase. Simple electric body hoist. Dumps clear over bank, tips vertical to clean fast. Turning radius 90° or 12 1/2'.



TOURNAHAULER . . . 20-ton flat-bed can take heavy construction, oil field, logging, and mining equipment and supplies on or off highways or cross country. Traveling overhead monorail car with 5, 10 or 15-ton electric hoist optional — one-man operated from the ground by remote control or from the cab. One hauling contract often pays for entire cost of hauler.



TOURNAHOPPER . . . bottom-dump hauler . . . 15-yards heaped, 16-ton capacity. Tournamec differential, giant tires, and high clearance take it through muck and gumbo. Easy loading . . . top opening 8' x 8'. Easy to drive over windrows, clamshell-type dump-doors lift clear, give 22" clearance open. Turn radius 14'. 51% of loaded weight on drive tires.



TOURNACRANE . . . capacity, 15 tons with full maneuverability and travel with maximum loading. Maximum lift 35', reach 35'. Sliding boom on tilting track gives unique load maneuverability for structural repair and erection. Individual electric motors control each function independently. Reaches into "impossible" places . . . goes anywhere through sand, mud or gumbo.



TOURNAMIXER . . . transit-mix unit of 6 or 7 yards capacity ready to go anywhere on or off highway. Mixing speed 7 to 10 r.p.m. Two discharge speeds — 7 to 20 r.p.m. No need for chutes or elevators. Tournamixer dumps directly into forms at horizontal distance of 10' 7" back of wheels or at elevations from 4' 10" to 20' 8". All electric control from driver's seat.

LETOURNEAU
PEORIA, ILLINOIS



TOURNAPULLS

MORE YARDS PER HOUR WITH RUBBER-TIRED POWER

HT4 TRAXCAVATOR works at CAPACITY

WHEREVER THERE'S
TRACTOR "HEADROOM"



Wherever its compact "Caterpillar" Diesel Tractor team-mate can enter without bumping the operator's head, there the HT4 Hydraulic TRAXCAVATOR does its stuff at full capacity.

It digs hard material, crowds its bucket heaping full, with traction-harnessed engine power and hydraulic down pressure. It lifts the load smoothly to any height desired, for clearing low overhead obstructions. It carries at your choice of 5 practical speeds, from slow creep to brisk sprint. It dumps from any lift point.

For the Model HT4 TRACKSON TRAXCAVATOR is mounted on a "Caterpillar" Diesel D4

Tractor, and is operated by the dependable, constant-power "Caterpillar" hydraulic system. The valve has 4 positions — raise, lower, hold and float. Lifting arm cylinders are double-acting — so are bucket control cylinders. That enables exerting down pressure; gives complete bucket control.

Every practical operating feature asked for is built into the HT4 — the hydraulic companion of the world-famous line of cable-controlled TRAXCAVATORS. Sold and serviced by your TRACKSON-"Caterpillar" dealer! See him for complete information or write TRACKSON COMPANY, Dept. RS10, Milwaukee 1, Wis.

HT4
Hydraulic

TRAXCAVATOR

The Original
Tractor
Excavator

Does it
SAVE MONEY



FLEX-PLANE

YES.

FLEX-PLANE *Mechanical* BAR INSTALLER S



J. R. CHANDLEE, JR.

Throughout the United States contractors have proved that an impressive reduction in costs is achieved through use of the Flex-Plane mechanical bar installer. From job superintendents have come statements verifying the fact that the Flex-Plane method of installation is more accurate and less costly. Four comments are given here.

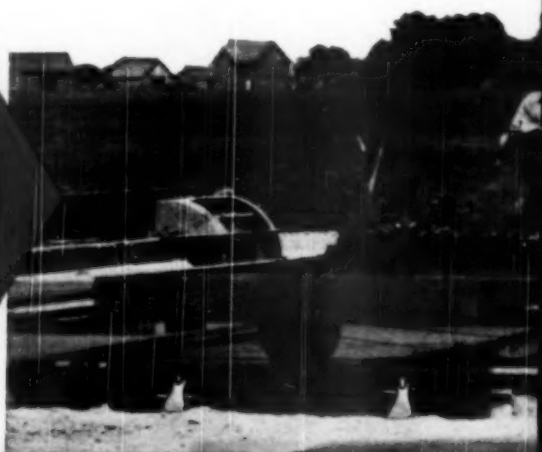
- J. R. Chandlee Jr., Superintendent of Ballinger Paving Company, Greenville, South Carolina. Mr. Chandlee comments: "It is a machine that solves a long-standing problem among concrete paving folks; that is, a mechanical method of economically installing contraction dowels and longitudinal tie-bars in concrete pavement at a positive depth and alignment satisfactory to good construction demands by efficient engineers."

SAVE COSTS ON EVERY JOB . . .

Check These Features

- Eliminates expensive dowel holding devices
- Installs bars more accurately and in better alignment
- Standard sizes for half-width or full-width construction
- Simultaneously installs contraction joints
- Performs four distinct operations at one time
- Adjustable for varying specifications of spacing and widths

An airport job where the Flex-Plane bar installer paid off! Dowels were installed to exact position; tie-bars were installed simultaneously; transverse joint was formed and longitudinal joint was cut and installed—all in one operation.



ER SAVED COSTS FOR THESE CONTRACTORS



JAMES A. BOLLINGER

● James A. Bollinger, Superintendent for J. Briscoe, Contractor, Stillwater, Oklahoma, gives an unqualified "Yes." They were completely satisfied with the value of the Flex-Plane mechanical bar installing machine. This contractor used the machine on a second job after the initial test proved its success.

● F. E. Fieweger, Vice-president of Central Engineering Company, Davenport, Iowa: "The dowel placing machine eliminates the use of dowel bar supports, which is a distinct saving in labor and material. There is no question in regard to a saving on large paving projects."

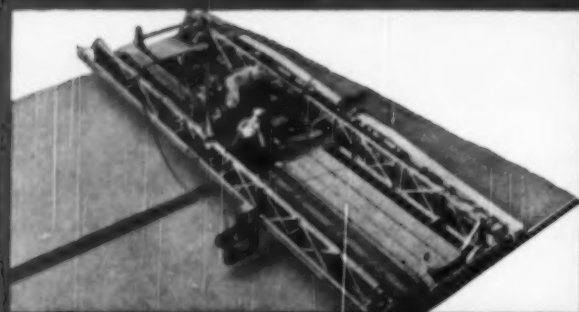
● C. W. Alley, Assistant Secretary, Worth Construction Company, Fort Worth, Texas: "The machine did the work quickly and kept dowel bars evenly spaced, much to the satisfaction of the engineers." Worth Construction Company estimates a saving of approximately \$5000.00 on a highway on which they used the machine.

THE Flex-Plane Mechanical Bar Installer is the only new machine developed for concrete pavers in the last decade (except the Flex-Plane spray machine). This machine is solving the long-standing problems of high costs and unreliable methods. Impressive cost reduction is achieved by the elimination of dowel holding devices and the coincident reduction in labor. Depending upon specifications, the machine has installed (1) transverse dowels, (2) longitudinal tie-bars, (3) transverse contraction joints and (4) longitudinal joints. In addition, you are assured of better dowel installations, because tipping and twisting of the dowel assemblies and honeycombing adjacent to dowel baskets are eliminated.

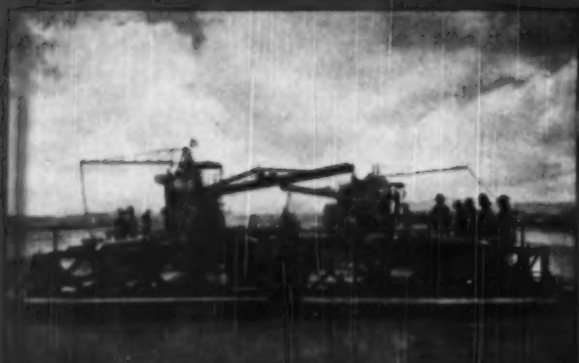
The machine, traveling on the forms behind the finisher, vibrates dowels to their exact position within the slab. There is a minimum disturbance to the slab surface—only the usual amount of hand floating common to any job is required. Additional technical information is available upon request.

Dowel machines are manufactured in two standard sizes: for half-width construction, with an attachment for forming transverse contraction joints; and for full-width construction, with attachments for forming transverse contraction joints, installing longitudinal tie-bars and installing longitudinal dummy joints.

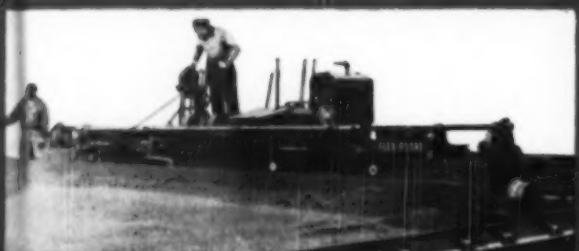




This Flex-Plane mechanical joint machine is used for applying material to bridge joints—gored, ridges or precasted.



This Flex-Plane mechanical joint machine is used for applying material to bridge joints—gored, ridges or precasted.



This Flex-Plane mechanical joint machine is used for applying material to bridge joints—gored, ridges or precasted.

FLEX-PLANE

Cost Reducing EQUIPMENT

Flex-Plane's engineering and production facilities are devoted exclusively to mechanized equipment and accessories. You can save money on every step of the job with better built Flex-Plane finishers, bar installers, joint installing machines and automatic spray machines.

Flex-Plane bridges, traffic line installers, hand tools and joint supplies are dependable for your work. Before you bid or buy, check Flex-Plane and be sure. Mechanize and save.

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- EXPANSION AND CONTRACTION JOINT EQUIPMENT AND ACCESSORIES
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- MECHANICAL DOWEL AND TIE-BAR INSTALLATIONS
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- BURLAP BRIDGES
- JOINT FINISHING BRIDGES
- INSTALLERS FOR PERMANENT TRAFFIC LINES
- KEY JOINT PLATE

For prices, wire Flex-Plane or telephone collect Warren 4-2141 or use the attached coupon.

FLEX-PLANE
WARREN, OHIO

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The Mechanical Bar Installer

Other Flex-Plane equipment

COMPANY NAME

ADDRESS

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FLEX-PLANE

THE FLEXIBLE ROAD JOINT MACHINE CO.

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Every model *Heavy-Duty Engineered* to save you money!

Now International puts you squarely in the driver's seat—with a complete new line of completely new trucks!

Every single new International Truck from 4,200 to 90,000 pounds GVW is heavy-duty engineered to give you lower maintenance and operating costs.

Let the facts tell that story:

Fact No. 1: for 18 straight years Internationals have

led in sales of heavy-duty trucks (16,001 pounds and over GVW). The men who buy heavy-duty trucks buy on a basis of performance. They choose Internationals.

Fact No. 2: the same management men, the same engineers, the same test experts, the same production men who kept Internationals first in the heavy-duty field, have developed every new International Truck.

Every model offers new high standards of comfort and easy handling



Here's relaxing roominess! Here's all 'round visibility! Here's a comfortable, adjustable seat! Yes—you get everything in the Comfo-Vision Cab!

You have full visibility in the one-piece Sweepstight



windshield. That convenient two-cluster instrument panel puts everything right in front of your eyes.

And when the truck starts to roll, you find that new Super-steering right for position, and positive control.

AND TALK ABOUT FEATURES...

Every new International Truck offers new improvements throughout !

NEW Functional Styling—Smart, brassy appearance combines modern design with extreme practicability.

NEW Outdoor Visibility—Giant, one-piece scientifically curved Sweepight windshield, large side windows, two rear windows.

NEW Comfo-Vision Cab—Model for model "the roomiest cab on the road"—with comfort cushions, adjustable seats, controlled ventilation.

NEW Super-Maneuverability—More positive control from a more comfortable position; new wide-tread axle assure the shortest practical turning circle and greater stability.

NEW Engine Accessibility—Special fender and hood design provides extra working space between engine and fenders—hoods easily removed.

NEW Valve-in-head engines—All test-proved for greater power, greater economy, greater stamina, greater efficiency.

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NEW Rear Axles for any job—Wider, sturdier rear axles—hy-poid single-speed, double-reduction and two-speed with electric shift.

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NEW Steel-flex Frames—Designed to provide an extra margin of strength combined with the right amount of flexibility.

NEW Load-balanced Wheelbases—Shorter wheelbases for standard body lengths provide better load distribution, better maneuverability.

NEW Cradle-Action Springs—Longer springs for greater riding ease... stronger springs, sturdier mounting and new spring suspension for longer life.

Plus dozens of new features and refinements throughout every truck!



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Every model proved under actual operating conditions!

There wasn't any price tag on the test program to prove the new International Trucks.

It was directed by men whose life work has been to develop better truck transportation. Test drivers were chosen as carefully as you do any key workers. All-outdoors was used for proving grounds. Laboratory analysis tests were backed up by track tests, then by actual road tests. Test convoys were run 'round the clock.

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INTERNATIONAL

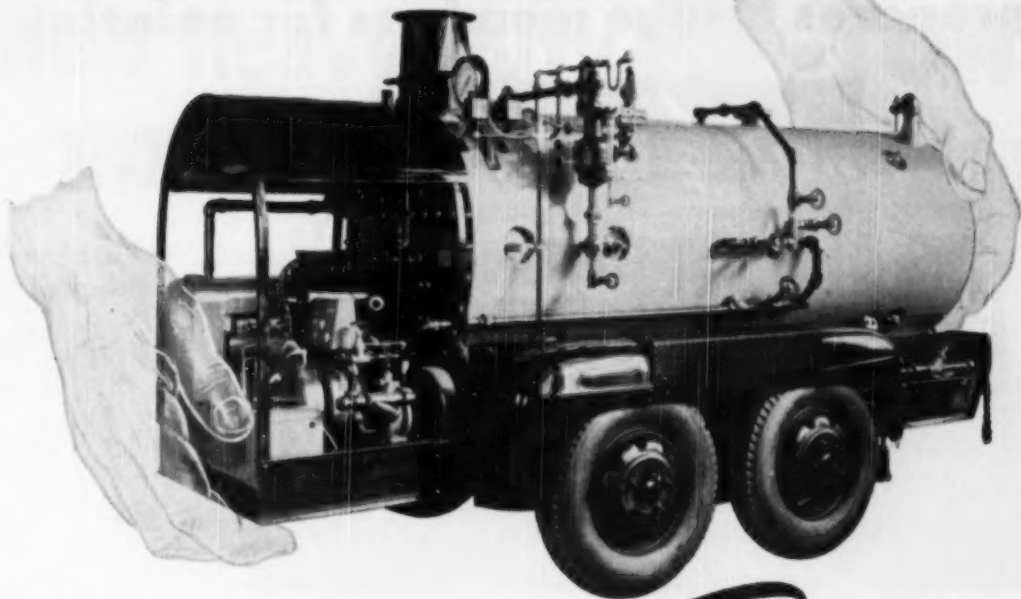
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Flame Cleaning prepares bridge members for painting

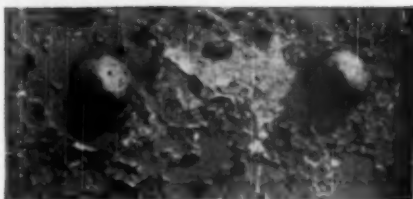


Leading engineers find that flame cleaning quickly prepares bridges, trestles and other metal surfaces for painting—with savings up to one half the cost of hand scraping and chipping. Further, in addition to actual dollar savings, they found that the flame cleaned surface produced a better finished paint job.

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For further details write for folder ADG-1066B — "Flame Cleaning and Dehydrating Old Steel Structures", and folder ADG-1067A — "Flame Cleaning and Dehydrating New Steel Structures". Write your nearest Airco office.



BEFORE — Close-up view shows conditions of paint-lift heavy rust and scale that were met.



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BIG NEWS for haulers of BIG LOADS! New Heavy-Duty **4-TON** DODGE "Job-Rated" TRUCKS

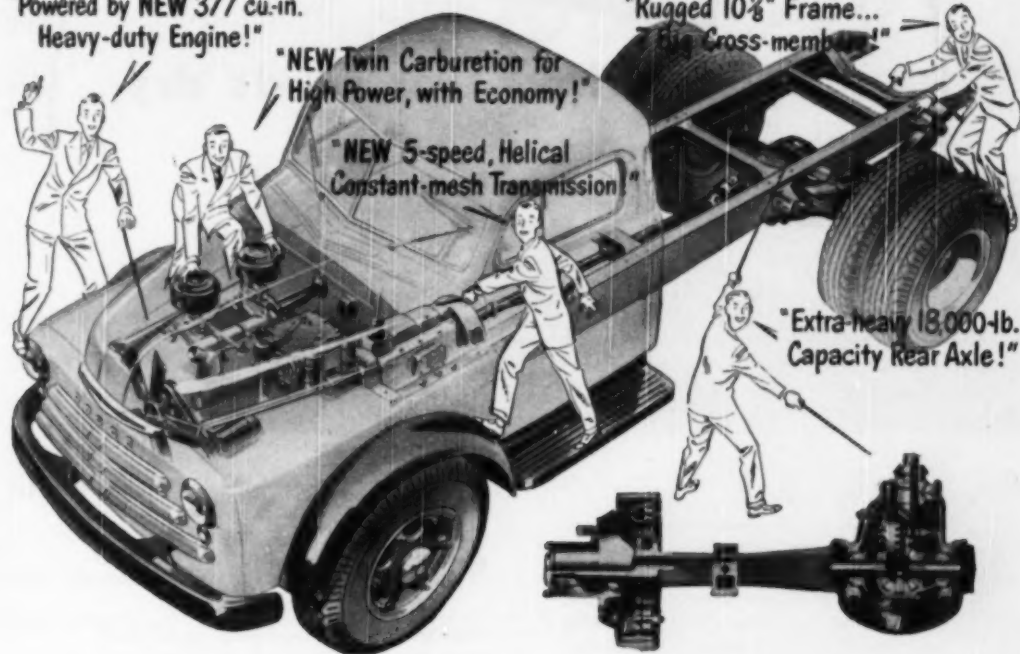
"Powered by NEW 377 cu.-in.
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"NEW Twin Carburetion for
High Power, with Economy!"

"NEW 5-speed, Helical
Constant-mesh Transmission!"

"Rugged 10 $\frac{1}{4}$ " Frame...
Big Cross-members!"

"Extra-heavy 18,000-lb.
Capacity Rear Axle!"



There's a new champion in the HEAVY-DUTY truck field. It's the new Dodge truck rated at 28,000 pounds G.V.W. . . . 50,000 pounds G.C.W.!

Ample "Job-Rated" POWER flows from one of the finest-performing, and most economical truck engines ever designed. It develops 154 gross horsepower, and 330 pound-feet gross torque.

This remarkable engine contains such advanced long-life features as Silchrome intake valves and inserts. Exhaust valves are Stellite-faced and sodium-filled to resist warping, wear longer.

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This "Job-Rated" load lugger has a new and rugged constant-mesh, 5-speed helical transmission, direct-in-fifth, with an extremely high torque input. A 5-speed overdrive transmission is available.

This 4-tonner has a rugged 10 $\frac{1}{4}$ -inch frame, with 7 and 8 big crossmembers; extra-heavy 18,000- and 22,000-pound capacity rear axles, and many other HEAVY-DUTY features you'll want to study and compare.

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See your Dodge dealer at your earliest convenience.

For low-cost transportation...switch to
DODGE "Job-Rated" TRUCKS

This Thirsty Pipe

drinks wet roads dry



When expensive road surfaces break up year after year, you'll generally find that subgrades are soggy with ground water. A good way to end this continuing maintenance expense is to install Armco Perforated Pipe. It drinks up excess water, leaves the subgrade dry and firm.

An Armco Subdrainage System is easy and economical to install. The long lengths of pipe are light in weight for easy handling and can be quickly joined with simple band couplers by unskilled workmen. There are fewer sections to lay, fewer joints to assemble. Work moves fast and installation costs are low.

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Specify Armco Perforated Pipe for complete road drainage systems or for correcting trouble spots wherever they occur. Write for complete information. Armco Drainage & Metal Products, Inc., 2270 Curtis Street, Middletown, Ohio.

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ARMCO PERFORATED PIPE



THE BUTLER SALES MANAGER EXPLODES:

**"HOW COME!
WE GOT ONLY
10 OUT OF 12?"**

"Listen you! I'll repeat it! How come we got only 10 out of 12 of the Batching Plants on that big Detroit-Wayne Major Airport job?

Butler Salesman: "Well, ah—you see—ah—

Butler Salesmanager: "Yeah! I see alright . . . Where were you when those two other plants were bought? Playing marbles, maybe?

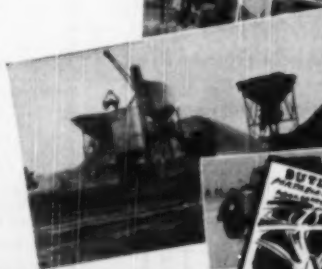
Butler Salesman: "Oh, no sir. You,—well, I mean—

Butler Salesmanager: "Shut up! I'll do the talking. You *know* Butler Batching Plants sell themselves. All y' gotta do is just be there to know what's wanted.

Butler Salesman: "Yessir. I—ah—well,—

Butler Salesmanager: "Only 10 out of 12! —?%\$*#""!!* I oughta shoot myself!

Yes, it's true alright. Out of 12 Bulk Cement and Aggregate Batching Plants used by the three-contractor Team that built the Detroit-Wayne Major Airport, only 10 were built by BUTLER. We just don't understand it!



BUTLER BIN COMPANY

959 Blackstone Avenue

Waukesha, Wisconsin



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35

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*Climaxes 50 years
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TO CHAIN SAWS**

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BACKFILL TAMPER—Tamps more yards of dirt than several men with hand tool.



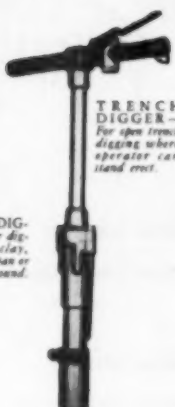
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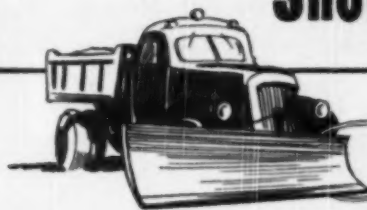


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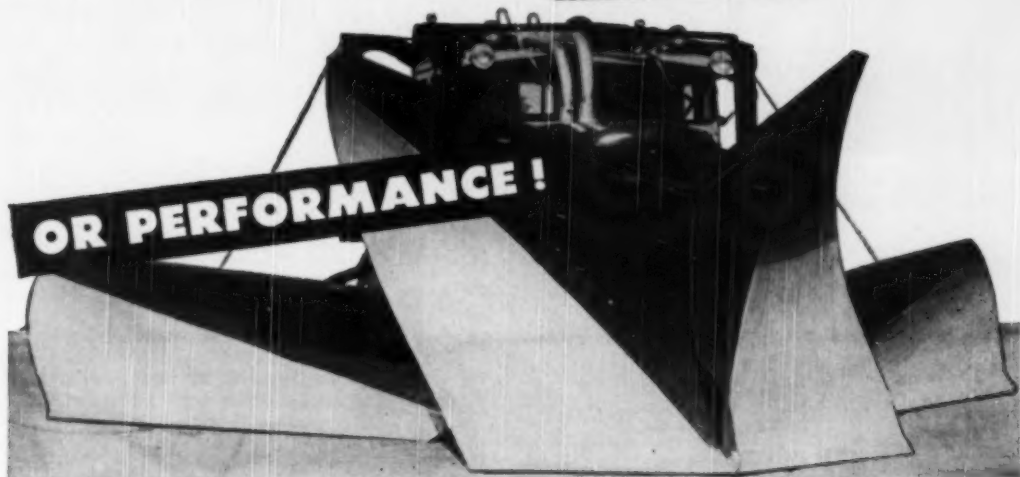


WDR-126 WAGON DRILL—Drills at any angle to depths of 24 feet or more.

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Snow removal equipment is a long term, capital investment for emergency use. Don't let the price tag decide your purchase. Figure the first cost, plus the total operating cost during the total years of useful life. Then measure this against the volume and mileage of snow cleared, the protection to your community, during that period.

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— the lowest cost snow removal equipment
Remove more snow — clear more miles — serve more years



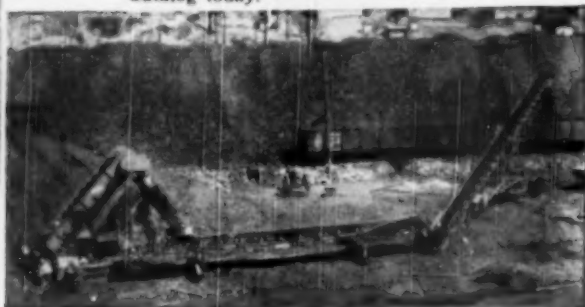
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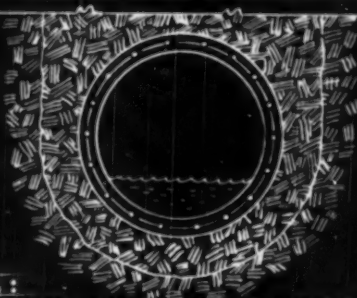
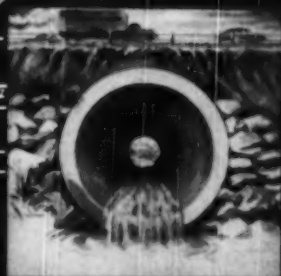
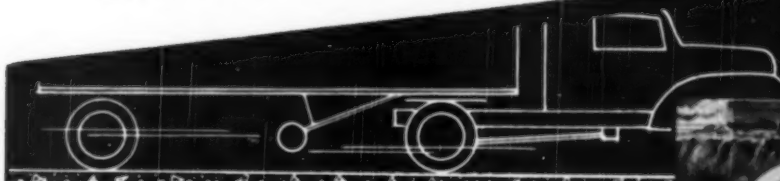
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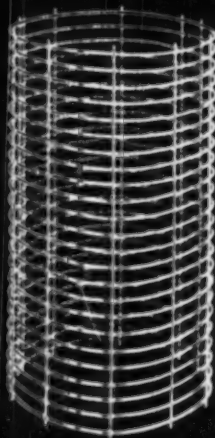
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WIDTHS: Furnished in widths and with overhang suitable for reinforcing concrete pipe.

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NEW!

- 8 Simple, 2-speed transmission; rugged, long-lived, completely accessible.
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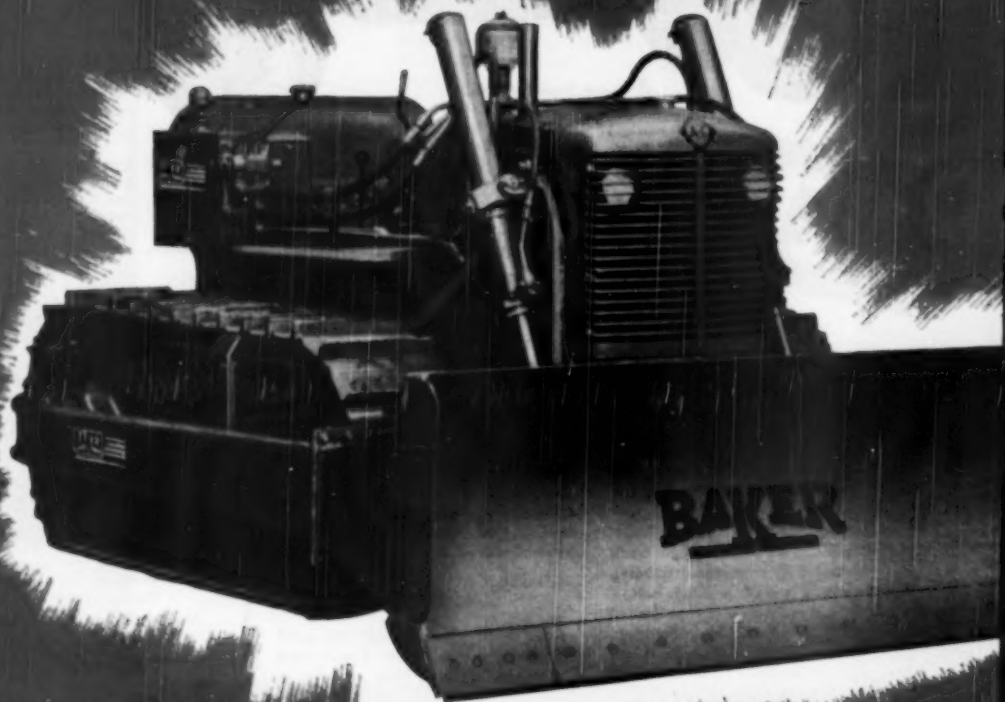
IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

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BAKER

engine

for the **ALLIS-CHALMERS**



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They're here — sensational, new Baker Bulldozers and Gradebuilders, ready for your job whatever it may be within the range of the Allis-Chalmers HD-5 tractor. They're engine mounted and they pack a terrific wallop — they're well balanced, extra sturdy, and built for big volume, tough earthmoving.

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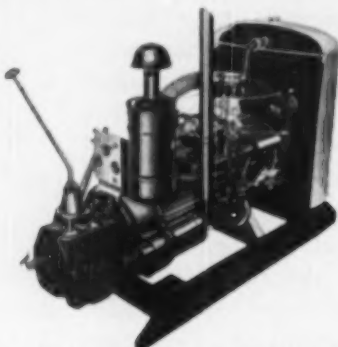
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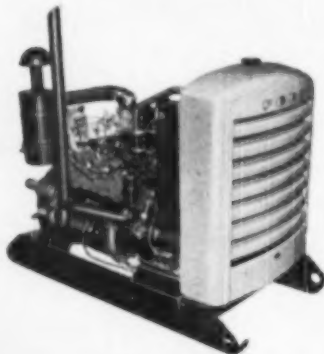
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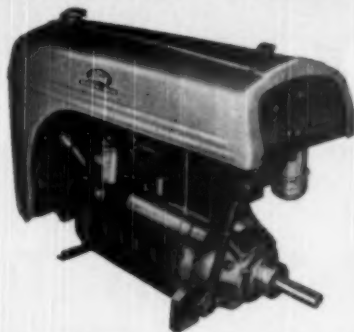
Pad mounted oil filter . . . Full length water jacketing . . . Recirculating pressure cooling system with thermostat . . . Counterbalanced crankshaft . . . Heavy duty, replaceable thin shell copper lead bearings . . . High lift camshaft . . . Balanced carburetion (downdraft or updraft) . . . Heavy duty oil bath air cleaner.

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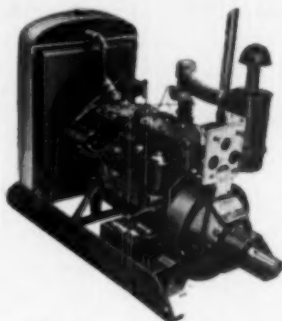
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Complete

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| Model | Cyl-inders | Bore and Stroke | Displ. cu. in. | Dyn. B.H.P. | Max. Torque | Equipment Available |
|-------|------------|-----------------|----------------|-------------|--------------|---|
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| 226 | 6 | 3.3 x 4.4 | 226 | 80 @ 2400 | 182#' @ 1200 | Clutch, SAE #3 or #4 bearing, power take-off, Ford housing, 3, 4- or 5-speed transmission, governor. (Available as closed or open type power unit, or engine assembly.) |
| 239 | V-8 | 3 1/4 x 3 3/4 | 239 | 85 @ 2400 | 187#' @ 1600 | Clutch, SAE #3 or #4 bearing, power take-off, Ford housing with 3, 4- or 5-speed transmission, governor. (Available as closed or open type power unit, or engine assembly.) |
| 254 | 6 | 3.5 x 4.4 | 254 | 95 @ 2400 | 212#' @ 1200 | Clutch, SAE #3 or #4 bearing, power take-off, Ford housing, 3, 4- or 5-speed transmission, governor. (Available as closed or open type power unit, or engine assembly.) |
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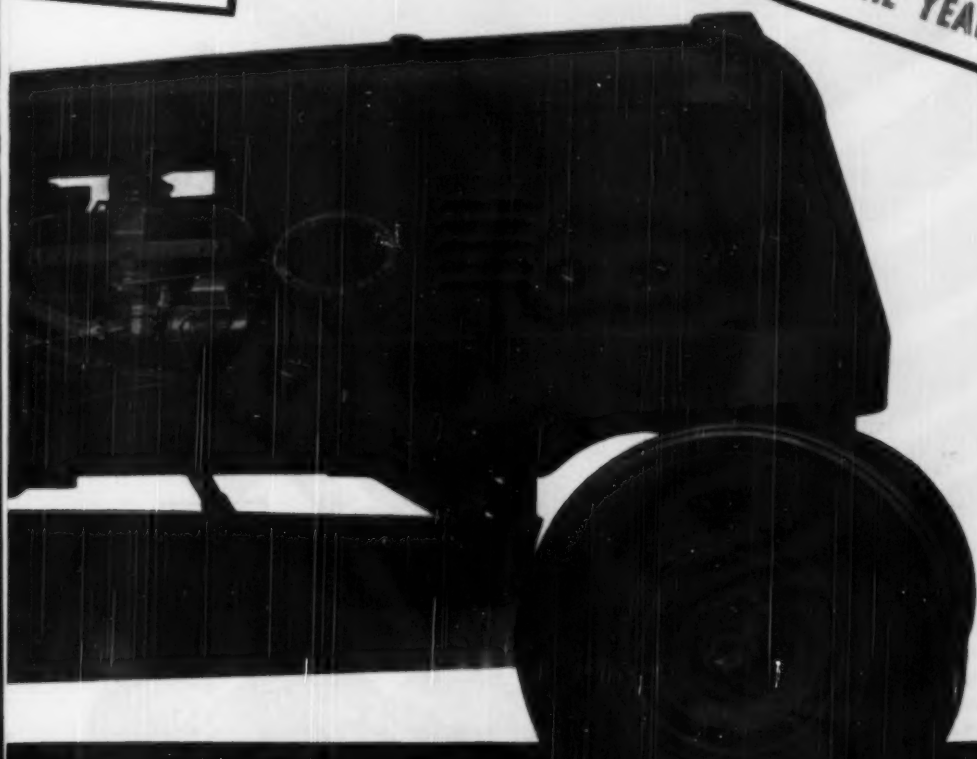
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How 340,000 Cu. Yd. of Sandstone

Was Excavated with Rippers and Scrapers

Extra winter shifts to prevent overnight freezing of work, and channel changes of an unusual nature, were required in this project which was handled with a relatively small earthmoving fleet

SOMETIMES sandstone is soft enough to excavate with a scraper outfit, and this proved to be the case on a recent Wisconsin road job. The project was a 3.23-mile relocation section on Wisconsin state route 11, in Green County near Browntown. The contractor was Ray Millis, of Black River Falls, Wisc. The 575,000 cu. yd. of excavation included 40,000 cu. yd. of marsh excavation and 340,000 cu. yd. of silica sandstone of varying hardness known locally as Saint Peter sandstone. About 230,000 cu. yd. of the sandstone was moved out of a single big cut.

Following data were supplied by Alton M. Huth, resident engineer on the project, and S. E. Hicks, engineer of construction supervision, Wisconsin state highway commission.

How Cut Was Made

The majority of the sandstone was excavated and placed during the winter months, when the marshy ground over which haul roads were built was stabilized by frost and flooding was least likely to occur.

The 230,000 cu. yd. of sandstone was excavated from one rock knob (in picture) located south of the highway centerline and within the right-of-way. This material had to be hauled west over a 4-bent temporary bridge built over the Pecatonica River, and east over a 72-in. pipe crossing over Skinner Creek. The temporary stream crossings were necessary because the new bridge over the Pecatonica on this relocation was being built simul-

taneously under another contract. The rock knob was of triangular shape, about 500 ft. on each side. Its vertex projected into and restricted the flow of the Pecatonica River.

The depth of excavation varied from approximately 70 ft. at the base of the triangle (south right-of-way line) to 40 ft. at the vertex. For the most part, the sandstone was loosened with a single-tooth ripper pulled by a D-8 Caterpillar tractor and at times with assistance of a D-8 pusher. The material loaded quite readily into the LeTourneau scrapers with the help of a D-8 pusher or D-7 bulldozer. Dynamite was used along the line of the backslope to facilitate shaping; also in

an occasional hard ledge, and along the outer edge of the knob where the sandstone was more firmly cemented.

Continuous Winter Work

Excavation was pushed continuously throughout the 1948-49 winter months. During the coldest weather the ripper was worked an 8-hour shift at night and over weekends, and during two periods of high water when haul roads were flooded, in order to prevent freezing of the exposed surface of the cut.

The channel of the Pecatonica was moved a distance of 70 ft. into the nose of the rock knob, and to a depth of 8 ft. below normal water in order



★ View of 70-ft. cut being made through silica sand rock, shown at 45 ft. level

to shift the river away from the 20-ft. fill on the west approach of the new bridge. The channel of Skinner Creek, which had previously entered the Pecatonica immediately east of this location, was cut through the bottom of the triangular cut area approximately 110 ft. from the vertex to a depth of 7 ft. below the normal bottom of the excavated area.

Grading operations, including minor blasting, rooting, loading, placing, and the travel of track-laying tractors over the material while loading and placing in 6" to 12" compacted layers, reduced the sandstone to a stable sand fill without the use of any special equipment. The material loaded well and placed readily with normal payload for the type of equipment used.

That portion of the rock cut which was below water was drilled with a wagon drill, holes being located at about 5-ft. centers to a depth of 11 ft. This yardage was loaded out with a 1-yd. dragline and hauled with scrapers. Depositing of this material was controlled so as to prevent freezing of the fill material between successive lifts.

In addition to the above, approximately 60,000 cu. yd. of sandstone



★ On the Ray Millis job in Wisconsin—William Lowe, foreman; Ray Millis; Al Huth, in charge for state; and assistant engineer A. L. Gausmann

was borrowed from four areas off of the right-of-way. These deposits were of varying depths up to 20 ft. Borrow material was loosened and handled with the same type of equipment used in the big cut.

Only 248 calendar days were required to move the bulk of 575,000 cu. yd., whereas 371 days were provided for completion of the contract as a whole.

William Lowe was superintendent for Ray Millis. A. L. Gausmann and Douglas Miller were assistant engineers under resident engineer Huth.

Pennsylvania Expanding Radio Use

Radio equipment is being used more widely than ever before in Pennsylvania this winter to help keep roads open, according to Warren K. Myers, state highway maintenance engineer. Its more limited use due to lack of equipment in past years has abundantly proven its value.

"Winter brings more emergencies than any other season," Mr. Myers

notes. "We are compelled to constantly re-route our equipment to meet changing situations. Radio has been most effective." Six million dollars was budgeted for Pennsylvania state road snow removal and cinder operations, but the expenditures are secondary to the main task of keeping the roads open.

A state-wide snow fall brings nearly 1400 trucks, 150 power graders, 100 tractors and upwards of 2500 snow plows into action. About 1,000 snow plows are mounted on trucks leased as conditions require.

About 600,000 tons of cinders and sand has been stockpiled along curves and grades, and 13,000,000 feet of snow fence set up.

A guide to airport owners and operators who are concerned with the many problems of turfing is available in the recently published CAA booklet, "Airport Turfing."

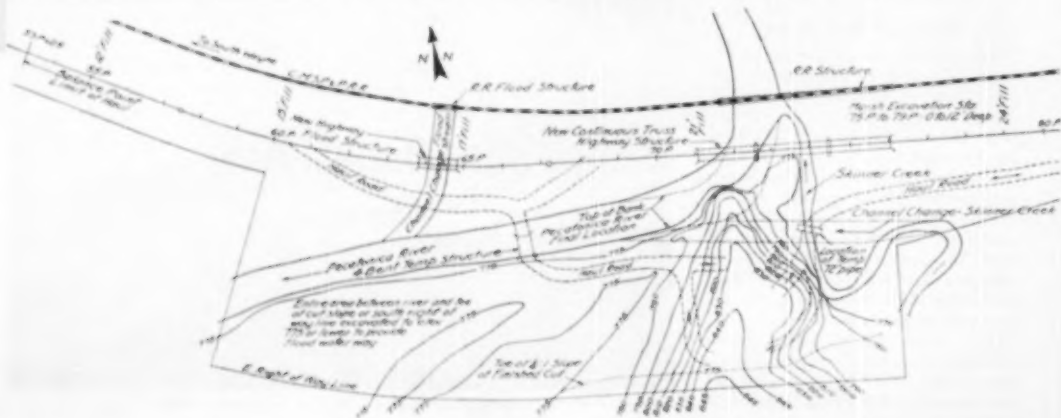
Available from the U. S. Government Printing Office, Washington 25, D.C., at \$.25 per copy.

Millis Job—Quick Facts

Peak day's production was 6,132 cu. yd. in a 10-hour shift. On best days each of the six scrapers averaged 7 trips per hour with average payload of 14.6 cu. yd. Average haul was 850 ft.

The Millis fleet included five D-8 Caterpillar tractors, three D-7's with bulldozers, two HD-19 Allis-Chalmers tractors, six LeTourneau 15-yd. scrapers.

Work started Sept. 27, 1948; completed, July 19, 1949.



Final O'Mahoney Report Cites 41 Billion Road Need

NEW evidence of the size of our highway building job and its importance to the nation's prosperity is contained in a report entitled "Highway Needs and the Nation's Economy." This report was issued on Jan. 25 by the Joint Congressional Committee on the Economic Report, Senator Joseph C. O'Mahoney, chairman.

Significant quotations from this report follow:

"Final reports on the accumulated needs of our highway systems reveal an even greater market for business and industry in filling this important gap in our national economy than was shown by our earlier estimates. Of course, this is a program which would require years to accomplish.

Staggering Sums Listed

"All States have now submitted their data in response to the inquiries addressed to the governors and state highway departments last July relative to the accumulated need for repairs and new construction on the roads within their states. They report that correcting the deficiencies of our present state highways alone will require an expenditure of \$23,044,630,320.

"An additional \$10,400,000,000 will be needed to bring county and local rural roads up to present-day requirements. City and village streets, if adequate to meet the needs of our modern national economy, would require the expenditure of an additional \$7,700,000,000.

"Nine states report combined needs

on all roads and streets within their borders of more than a billion dollars each. Ohio is first with estimated total current requirements of \$4.5 billion, followed by Texas, \$2.4 billion; California, \$2.6 billion; Illinois, \$2.5 billion; New York \$1.8 billion; Michigan, \$1.4 billion; Georgia, \$1.3 billion; Tennessee, \$1.2 billion; and Massachusetts, \$1.1 billion. The estimates for other individual states are given in the attached table.

"The dollar estimates of highway needs cover a great range of improvements, from resurfacing to new construction, and include in addition all types of highway structures. The State of Illinois, for example, reports 64,900 miles of road as now deficient, an estimate which includes new surfacing, resurfacing, resurfacing and widening, right of way acquisitions, and structures. Present needs in South Dakota would require the grading, widening, or surfacing of 20,895 miles of road on the county highway system, 51,874 miles of road on the township highway system, and 2,842 miles of city streets. Mississippi reports 2,276 miles of rural state highway in need of improvement and 199 miles of urban state highway with deficiencies. The greatest highway needs in Mississippi are reported for the county roads where 11,332 miles need modernization at an estimated cost of \$160,490,000. Colorado reports that 13,688 miles of its highways, roads and streets are currently deficient. Other states report an equally large proportion of their mileage in need of major repair or extension.

Employment for Millions

"The vital importance of maintaining a highway system capable of meeting the demands of a \$250 billion economy and the size of the market it offers is apparent when we recall that almost 900,000 persons are employed in manufacturing motor vehicles, tires, and parts, and 100,000 more are engaged in producing the gasoline consumed by the nation's cars and trucks. Over 1,500,000 persons are employed in selling and servicing the vehicles traveling over 400 billion miles on our highways and at least 600,000 persons are engaged directly in the construction and maintenance of our highway, roads and streets.

Indirectly, many people derive all

or part of their income from the highway transportation industries. Eighty per cent of the rubber, 75% of the plate glass, and half of the malleable iron produced by the nation is consumed by the automobile and truck industry. Fifty thousand motels, restaurants, etc., are dependent upon our highways. The total vacation travel income in the country is estimated to be over nine and one-half billion dollars. In the State of New York alone it amounts to 1 billion dollars and Florida estimates its vacation travel income at two-thirds of a billion dollars.

"It is evident from the facts supplied to the committee by the persons closest to the road building problems in the several states that if the American highway systems are brought up to the standard of modern requirements it will provide a stimulus to all business and industry for years to come."

Kansas Lowest in Concrete Pavement Construction Costs

A recent study released by the Bureau of Public Roads reveals wide differences in the cost of building concrete pavement.

Kansas, Texas and Michigan costs were lowest. Because of the difference in thickness of pavements in various parts of the nation, the comparison of construction costs was made on the basis of a square yard one inch in thickness.

The cost varied from 36.1c per sq. yd. 1 in. in thickness in Kansas to \$1.076 in Nevada. Michigan's cost was 36.8c. The national average cost is 42.1c. In Illinois the cost is 48c; Ohio 44.7; Pennsylvania 51c; Indiana 45.3c; Wisconsin 43.6c; and Kentucky 56.2c.

Meetings Ahead

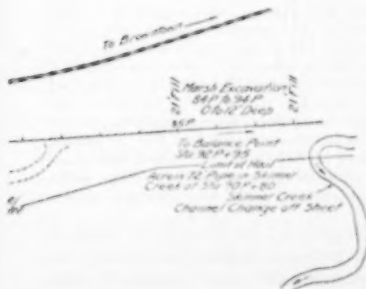
Association of Highway Officials of North Atlantic States: Hotel Statler, New York; February 20-23.

Associated General Contractors of America, Inc.: 31st annual convention; Palace Hotel, San Francisco; February 27-March 2.

American Road Builders' Assn.: 47th annual meeting; Netherland Plaza Hotel, Cincinnati, Ohio; March 6-9.

University of Utah, 11th Annual Highway Conference; Salt Lake City, March 29-31.

Third Highway Transportation Congress, sponsored by National Highway Users Conference, Mayflower Hotel, Washington, D. C., April 26-27.



★41 Billions for Roads—Where's It Coming From?

It's time to speak up again.

The volume of highway construction has reached an all-time high dollar level after six years of continuous climb from the war-time low—*yet we're still only building half fast enough!*

The year 1950 will see 1.8 to 1.9 billion expended on highway construction, plus another 1.3 or 1.4 billion for maintenance. But where is the "new" money coming from to reach the 4 billion pace needed for road construction alone?

Public interest in highway conditions is also at an all-time high, along with climbs into new high ground of vehicle registration and travel-mileage. Hence the annual investment in the Nation's roads is bound to creep upward. But there isn't time for creeping; our present roads are wearing out too fast. The latest publicity on highway needs shows \$41 billion to be the cost today of bringing up our highways of all classes to a level considered by engineers merely to be "adequate." The \$41 billion figure came from the Joint Congressional Committee on the Economic Report, Senator Joseph C. O'Mahoney, chairman, which has issued a final committee report entitled "Highways and the Nation's Economy." This is only part of the bill motorists and truckers must eventually pay to keep going. Adding 35% for overcoming new obsolescence during the 10 years and a billion or more yearly for maintenance, the 10-year job will cost *65 billions!* This is what U.S. people must invest to alleviate congestion, reduce accidents somewhat, replace wear and tear, and put our road network on a satisfactory basis of utility and efficiency.

Public Demand is Strong

When President Truman pointedly omitted any substantial increase in federal highway aid from his annual message in January, the first disposition of highway authorities and business leaders was to feel depressed over the highway outlook. However, there persists a lively public demand for liberalizing and increasing highway aid, and the hope is strong for a new highway aid law increasing federal support from the present \$450 million annual level. \$810 million annually is the policy recommended by the American Association of State Highway Officials. Meantime, this is an off-year in state legislative halls, and what of the state road financial picture? This is an opportune year to continue (or begin) highway fact-finding on a statewide basis. New state highway revenues are badly needed nearly everywhere. For even though Congress should decide to pay 75c on the dollar for improving the interstate highway network, as is proposed, the total matching sums expected of the states in an enlarged

federal-aid program will be stiffer in the future. Enacting additional revenues takes time, and cannot be done overnight since fair and sound legislation of this kind requires lengthy compilation of facts about highway needs and analysis of highway benefits and possible sources of revenue.

None of us would want to be held responsible a few years hence for the blight that will settle on our commerce and farming if our roads get worse instead of better—in short, if something like the full 41 billions isn't forthcoming. Our citizens must see the necessity for—and the profit to them—of paying substantially more for the kind of roads that will permit continued prosperity. This means sharp increases in the gasoline tax rate and the license fees in many states, and particularly it must include a more equitable scale of charges to commercial users. Property taxes for local benefits may also have to again become an important revenue source for local roads and streets. Bond issues will help some states over the immediate hump, but this merely postpones the day of reckoning.

So we again urge that public leaders in every state work with their highway building agencies on the problem of setting up action that might lead toward soundly considered increases in state highway funds. In a number of states today interim legislative committees are compiling highway information. More states should have such organizations, properly sponsored either by the legislature itself or by some other unbiased agency representing a true cross-section of the road-using public.

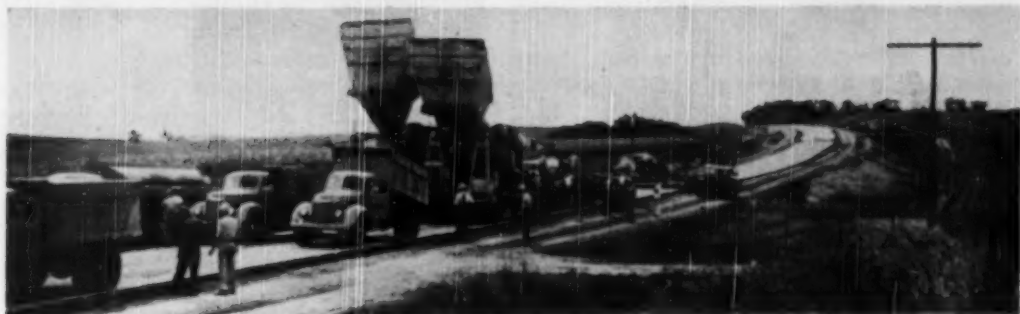
A Service Opportunity

A growing number of states also have seen a re-awakening of the old good roads association idea. Here is perhaps the best opportunity of all.

Highway planners and engineers can't supply the roads the people want unless the people become articulate through their legislatures and Congressmen and help make the funds available far in advance. Since the Nation's economy is one seventh automotive manufacturing and highway transportation, this would seem to be a tremendous opportunity for public service waiting to be grasped by political and community leaders. For we should all remember that good highways cost no more than poor ones, and hence roadbuilding first-costs literally write themselves off in motorist benefits and business stimulation.

Highways have progressed far beyond the point at which a good road is merely a cheaper, quicker way for an individual farmer to get into town. Quoting Senator O'Mahoney, "Final reports on the accumulated needs of our highway system reveal an even greater market for business and industry in filling this important gap in our national economy than was shown in earlier estimates."

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS



★ Twin pavers operating on US 59 in Crawford County, Iowa

"Siamese Twin" 34-E Pavers

Used Side by Side Between the Forms on Iowa Concrete Paving Jobs

Unprecedented pace of 3000 to 3660 ft. of full-width slab placement per day achieved, but fast pace spotlighted problems of finishing, equipment balance and inspection control

Roads and Streets Staff Report

IN these days when 1,500 lineal feet is a mighty good day's run for a full-width concrete paving job, an Iowa contractor has come up with a scheme which put his double-lane pace up in the 3,000 to 3,600 ft. per day and faster bracket. In one day last summer, on August 25, Western Contracting Corporation, of Sioux City, placed 3,664 lin. ft. of 8-7-7-8 concrete road pavement 22 ft. wide. In 48 elapsed days—only 35 days, taking out the rainy days—this contractor completed all paving on a 12.9-mile section of US 59 in Crawford County, Ia., comprising 172,000 sq. yd. of slab.

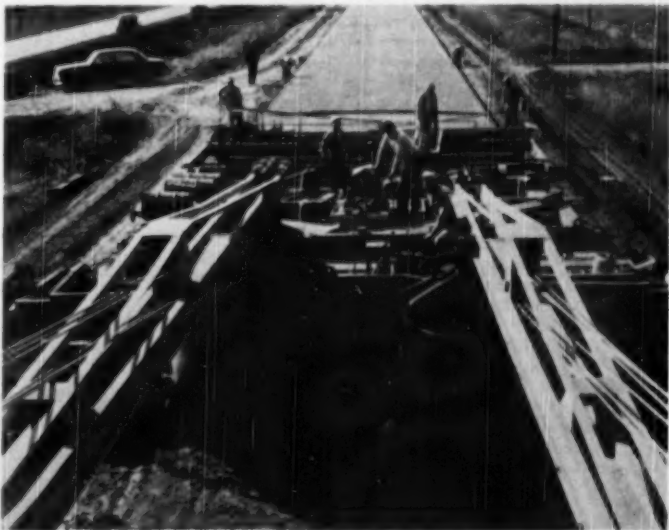
Unique Paver Hook-up

The innovation that contributed largest to this phenomenal pace was the use of two 34-E dual drum pavers, not in the usual tandem, but close-coupled, "Siamese twin" fashion, traveling along between the forms with ships pointed backward in parallel. This arrangement, if not new in the industry, is at least a "first" in Iowa. The twin-paver setup also was employed on a second project during the season, consisting of 11.6 miles of concrete pavement 24 ft. wide and 10-9-9-10 cross-

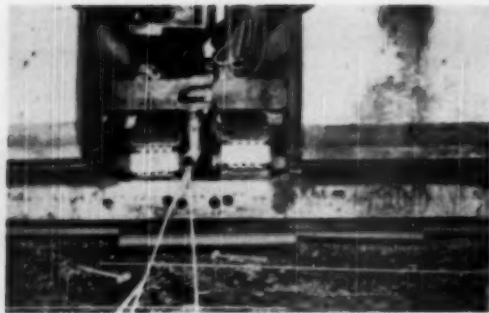
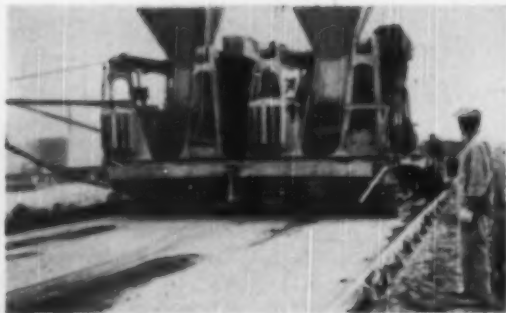
section on US 75 in Plymouth-Woodbury counties north of Sioux City. The daily footages here were less, due to the

greater depth and width, but were still far beyond earlier Iowa experience.

The two pavers were linked together with pin-connected steel I-beams running transversely across the back of the pavers. Two lines of longitudinal reinforcing steel were funneled through a pipe running between the pavers (see photos). The mix water and other details of the two machines were synchronized.



★ Booms in parallel, each operating in a small arc, placed concrete nearly simultaneously.



★ Pavers were coupled together by means of linkage between steel I-beams across the rear of the pavers. Note also steel pipe through which reinforcing was threaded.

★ How subgrade paper and reinforcing bars appeared immediately behind the pavers.

The rapid pace achieved by Western Contracting Corporation, along with the performances of other fast-moving contractors over the U.S., has posed a number of interesting questions. One is the economic problem of unit cost, which of course eventually means bid price. Undoubtedly it was to the advantage of Western Contracting to achieve the pace they did, since job overhead, equipment amortization and other cost elements can be spread over more pay yardage per season. Western laid 480,000 sq. yd. of pavement in Iowa and South Dakota during 1949 with one outfit. This is high production, and high production, explained a Western spokesman, is synonymous with two dual-drum-pavers. The practice of operating two dual-drum pavers from the shoulders, as is done in the prairie states with their flat roadbeds and ditches, was not considered adaptable to the rolling Iowa terrain, with narrow roadbeds alternating in cut and fill. This contractor designed the coupled paver system initially in order to operate two pavers on the Crawford County (US 59) project. The method certainly aided in capacity use of batch plant and finishing equipment.

Contractors are constantly devising ways to accomplish more work per day with a given outfit, and the entire highway engineering program and the

motoring public are getting more for the highway revenue dollar as a result.

Problem of Balance

In the case of these two Iowa jobs, on the other hand, the unusual paver speed introduced many field problems never foreseen in the old days of the 2TE paver. These difficulties were not completely solved during the season. The 24-ft. slab with 10-9-9-10 in. section, however, slowed the two pavers down somewhat, compared with the 22 ft. by 8-7-7-8 slab, and the reduced footage made it possible to secure proper finish on the heavier slab with less effort from the finishers and inspectors.

One task affected sometimes by speed was form setting. It is admitted-

ly quite a job to set 7,328 ft. of forms per day and get them tamped solidly enough to take the beating they get from a train of full-width finishing equipment. The Western crew seems to have gotten quickly on top of the form setting problem, however. Additional men and tools help handle the high footage.

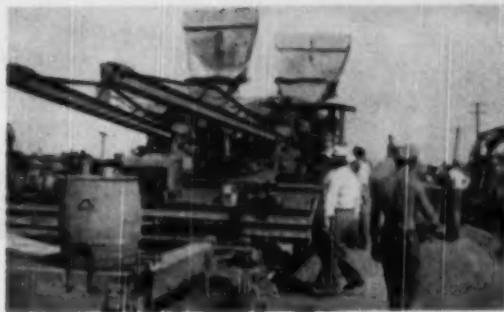
Another part of the paving operation that is a notorious time-loser everywhere is delivery of dry batched material to the pavers. This the Western men handled very well by close control of truck movement at all times, and by working out a system of quick turn-arounds. Trucks turned in gaps in the road forms made by taking out three form sections. After being taken over the subgrader by means of a ramp, the trucks were turned around and backed 500 to 600 ft. to the paver skips. Despite the necessity of 50 truck arrivals per hour in top going, batch delivery did not prove to be a bottleneck.

Trouble Behind Paver

The first real bottleneck on the 22-ft. slab occurred between the pavers and the spreader. The subgrade paper specified had to be properly spread, a little shovel work done and the steel brought in and staked. These details had to be performed with two booms



★ More views of the "Siamese Twin" paver hook-up which resulted in 3,664 ft. of 22 ft. slab on peak day.



★ Batch trucks backed over the subgrade to the two skips in closely synchronized delivery schedules

hanging out over the work and the buckets coming out and dropping 37.4 cu. ft. batches at the rate of two each forty seconds. Fast work was required here to straighten and if necessary re-pin any steel knocked out of position. This is a tight spot where it was difficult to make room for more men. The inspector had to hump and so did the contractor's men, and inevitably the pavers had to wait now and then to insure the proper carrying out of every little detail in accordance with plans and specifications. On future concrete paving jobs pushed at this pace heavier chairs might need to be used, and other details modified to save time and insure the best possible job in the opinion of onlookers.

The spreader and finisher were able to keep up, taking care of the additional volume pretty much in stride. Two additional finishers might be needed on the fastest runs under similar conditions. [As has been the case in other parts of the country. One of the Pennsylvania Turnpike eastern extension contractors employed two spreaders and two finishers plus a mechanical bullfloat last summer to support two 34-E dual pavers.—Editor]

Bull-Float Problem

The single mechanical bull-float used was also a bottleneck at times. This machine, of a make that is a national favorite, is designed to cover 300 ft. of slab per hour, and on a 3,600-ft. day no time was left for the inevitable need to take the float back over spots that needed additional attention. If a float is pushed too fast, all that it pushes ahead is a soupy material, whereas for best results a good heavy mortar should be worked ahead, indicating that just the right time has elapsed and the concrete is in proper condition for floating. It might be necessary to require a second longitudinal bull-float machine on such fast jobs, working far enough behind to insure perfect results. The ideal distance back for this operation of course depends on the time of day, temperature, wind

velocity, humidity, etc., whether it be a cool June day or a 110° August day. It is understood that this problem is being considered.

The hand finishing operations consisting of straight-edging, initial belting, checking with straightedge, final belting and edging were carried on by about the same crew as has formerly been used with a single dual-drum machine. It is anticipated that two more men should be used as it is quite a job to pull the 8-in. canvas belt, and late in the afternoon these men are too tired to do a good job of belting.

The various shortages of labor and equipment caused by the increased footage were not serious, and can be corrected.

Pavers Across Bridge

On the Plymouth-Woodbury County project several short span bridges had to be crossed. These bridges were all of recent design and construction, and special permission was granted the contractor to move the mixers across these bridges simultaneously. However some of these bridges were skewed, and the short hook-up on the mixers would not permit one mixer to elevate itself 10 inches in advance of the other mixer. This made it necessary to disconnect the pavers before crossing skew bridges.

Some of Iowa's older bridges of longer spans were not designed to carry this much to a load (80T) and it would be necessary to disconnect the pavers before crossing bridges of this vintage. About three hours' time was required to disconnect and connect the pavers again after a bridge was crossed. It might be worked out to separate the pavers about 200 ft. in advance of the bridges and use only one paver to pour the approaches, then the pavers would remain separated while crossing the bridges.

The Western Contracting Corporation's innovations are considered by many of the state highway department men to be a step forward. With a few

minor changes it is expected that the 2-paver hook-up can be made to work more satisfactorily for both the state and the contractor. There is some disposition, however, to wonder if a somewhat more leisurely pace and shorter projects might be best for Iowa in view of the relatively small mileage of new concrete road jobs that can be financed each year.

Major items of equipment on the project were as follows:

- 2 34-E dual drum Koehring pavers
- 1 60S Koehring clamshell
- 1 Blaw-Knox spreader
- 1 Jaeger finishing machines
- 1 Koehring longitudinal float
- 1 Flex-Plane center strip machine
- 1 C. S. Johnson cement batch plant
- 1 C. S. Johnson aggregate batch plant

Earl Capel, district engineer, and George S. Stevens, resident engineer, represented the Iowa state highway commission on the project. Harry Schutt was superintendent, and Matt Zittirsch, concrete foreman, for Western Contracting Corporation.

Texas Highway Department Staff Reorganized

A complete reorganization of the administrative and executive leadership of the Texas Highway Department was effected recently. According to D. C. Greer, state highway engineer, the changes were made necessary by the growth of the state highway system and the enlargement of the resulting responsibilities of the department.

Heading the department directly under Greer is George M. Garrett, formerly district engineer of Fort Worth. Garrett, as deputy state highway engineer, will carry the direct line of authority from Greer and serve in his absence.

To assistant state highway engineers are included in the new organizational set-up. These are Frank S. Maddox, formerly district engineer at San Antonio, and Thomas C. Collier, engineer of road design in the main office.

Three chief engineers were appointed. Herbert Eldridge, now administrative assistant in Austin, will be Chief Engineer of Planning. John A. Waller, district engineer at Del Rio, becomes Chief Engineer of Construction and Maintenance; Russell J. Hank, engineer of materials and tests, assumes duties as Chief Engineer of Operations.



1950 AED Officers: Left to right, front row—**FRANK G. KNIGHT**, executive secretary, Chicago; **C. F. HALLADAY**, president, Sioux Falls, S. D.; **R. L. ARNOLD**, executive vice-president, Salt Lake City, Utah. Back row, left to right: **R. J. FYFE**, C.A.E.D. president, Regina,

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Equipment Distributors

Foresee Good but Highly Competitive Year

Over 1700 delegates and visitors attend 31st annual meeting of the Associated Equipment Distributors, held Jan. 15-19 in Chicago

PROSPECTS and problems confronting the construction equipment industry in the months ahead were in the forefront as a record-breaking attendance of 1700 distributor and manufacturer members met in Chicago last month (January 15-19) for the 31st Annual Meeting of Associated Equipment Distributors.

A feeling of moderate optimism over the outlook for 1950 seemed to prevail throughout the convention period, although the pressing need for increased emphasis on all phases of management, sales and service was stressed continually at the business sessions and panels which featured the four-day program.

C. F. Halladay of Halladay Dettman Company, Sioux Falls, S. D., was elected international president by active distributor members in attendance, to succeed W. W. Bucher of R. E. Brooks Company, New York.

Other 1950 officers elected to lead the Association during the coming year were R. L. Arnold, Arnold Machinery Company, Salt Lake City, executive vice-president; H. J. Hush, Griffin Equipment Corporation, New York, vice president; J. A. Benson, Benson Tractor Company, Houston, Texas, vice-president; R. J. Fyfe, R. J. Fyfe Equipment Company, Regina, Sask., Canada, vice-president; and E.

J. Crosby, Hedge & Mattheis, South Boston, Mass., treasurer.

The convention program opened with a welcome from Retiring President W. W. Bucher. Referring to the report of the Hoover Commission and to the hundreds of hidden taxes which add to the cost of nearly every commodity, he urged distributors to carefully analyze their business operations in an effort to eliminate the "leaks" and hidden costs which add to the cost of doing business.

Rental Equipment Problem

A six-man distributor panel moderated by W. A. Danner of Parker-Danner Company, Hyde Park, Mass., then took the floor to discuss "Today's Problems and Tomorrow's Profits."

Harry E. Shaw of Service Supply Company, Philadelphia, led off with a review of important developments affecting the equipment rental picture.

He cautioned distributors to determine their objectives in entering into the rental field, and to pattern their organization accordingly. A discussion of rental purchases, led by A. H. Jensen of Boeckh Equipment Company, Milwaukee, brought out many of the fundamental problems and considerations underlying this type of agreement.

The final participant on the morning program was C. M. Weinberg of Brown-Bevis Equipment Company, Los Angeles, whose observations on present-day financing, credit and collection problems brought out the increasing importance of these subjects to all members.

Following the noon luncheon, the panel resumed with P. A. Dufford of Intermountain Equipment Company, Boise, Idaho, outlining the factors governing a distributor's inventory policy. The problem of maintaining adequate



★ Panel discussion on joint problems of distributors and manufacturers at the Chicago convention. Panelmen: **S. J. OECHSLE**, Metalweld Co., Philadelphia; **HENRY MALE**, Milton-Male Machinery Co., Albany, N.Y.; **M. J. LYONS**, Lyons Machinery Co., Little Rock, Ark.; **M. L. GIBSON**, Gibson-Stewart Co., Cleveland, O.; **J. A. BENSON**, Benson Tractor Co., Houston, Tex.; **RAY L. ARNOLD**, Arnold Machinery Co., Salt Lake City, Utah.

turnover while meeting the needs of the equipment user was described as the key to this.

The present-day trade-in situation and the 1950 outlook in this regard was discussed by T. M. Sheehan of Empire Equipment Company, Sioux Falls, S. D., who called attention to the importance of establishing adequate yard-sticks for measuring the true value of trade-ins. Discussion also centered about the matter of compensating salesmen who take part in a trade-in transaction, and how the risk may be shared under today's market conditions.

Finally J. T. Hatten of Star Machinery Company, Seattle, delivered one of the outstanding talks of the entire panel with a summary of the major questions that must be solved by distributors in any approach to the matter of effective sales training.

Tuesday, January 17, was entirely devoid of scheduled business sessions in order to facilitate individual contacts between distributor and manufacturer members as was the following afternoon of Wednesday. This proved to be a popular arrangement.

Wednesday morning's program opened with the election of 1950 officers, and the adoption of a resolution urging support of the Taft-Hartley law through widespread dissemination of factual information dealing with this subject by members favoring the act, and further stating that "it is our considered opinion that the election of senators and representatives unfavorable toward the Taft-Hartley law will be detrimental to our national economy."

Speakers on the Wednesday program were Frank G. Knight, A.E.D. executive secretary; Walter L. Couse, president-elect of Associated General Contractors, of Walter L. Couse & Co., Detroit; Clarence Y. Palitz, president of Credit-America Corporation, New York; and Thomas S. Holden, president of F. W. Dodge Corporation, N.Y.

The official business portion of the 1950 convention program was con-

cluded with an outstanding open forum panel, composed of six leading distributors and seven leading manufacturers of construction equipment (see photos). Sponsored by the association's manufacturer members, this session was devoted to informal discussion of more than a score of key problems affecting "Development and Retention of Markets for Construction Equipment."

A wide variety of subjects relating to service, finance, advertising and promotion, training and education, production, inventories, general trade practice and the general market situation received the attention of this panel.

Among the entertainment highlights which featured the four-day program were the 31st Annual Birthday Party, in honor of Outgoing President W. W. Bucher, and an Early Bird's Breakfast on the opening day, also given in his honor by distributor members from his region (New York and New Jersey). Luncheons on Monday, Jan. 16, and Thursday, Jan. 19, were addressed by top-ranking speakers, while the Installation Luncheon on Jan. 18 saw 1950 officers and directors, headed by C. F. Halladay of Sioux Falls, take office for the coming year.

Excerpts from Knight

Executive Secretary Frank Knight's annual message included the following remarks:

"With the outlook pointing to all-out competition to maintain or increase sales volume, manufacturers may be expected to adopt a much more solicitous attitude toward distribution outlets. Effort will be made to overcome discontent brought about in some instances by casual interest in distributors during wartime.

"Manufacturers will make a strong bid for major position among distributors by working more closely with them on problems relating to sales promotion and training, trade-ins, co-operative advertising, inventories and financing. Production outlook for 1950 should be pleasing to the distributor.

Business Survey Data

"However, the equipment distributor occupies an "in-the-middle" position, and a glance over his shoulder at the picture on the other side is apt to dispell much of his pleasure. Distributors will have a greater responsibility to customers in 1950. The customer will expect better repair service, better parts service, and more efficient operation of equipment from the outset. Pressure for higher trade-in allowances will continue.

"There will be greater demand for financing and keener competition on prices. The distributor will have to bear down to improve salesmanship and to curb the rise of break-even points."

Knight quoted figures from a year-end business survey of AED members. Distributor's sales declined slightly during 1949, on the average, although increasing for 20% of the individual firms. Sales management, trade-ins, credits, collections, inventories and financing of inventories are the top ranking subjects of concern among distributors these days.

As to 1950 business, one-half the members expect an increase in sales averaging "up 10%" or so. (One spokesman for a manufacturer forecast equal construction equipment sales, and 10% to 15% better sales of highway maintenance equipment).

Equipment Financing

Financing of equipment purchases, both new and used, was a lively topic. One advisor urged that used machinery buyers be required to pay at least 30% down and take not over 12 months for the rest.

The construction machinery industry was observed to be in excellent financial health by Clarence Y. Palitz, president, Credit-American Corp. He noted, however, that sales expense has increased and that the machinery industry like all others has entered a highly competitive buyer's market. More machines now are bought for replacement, and distributors must watch their trade-ins carefully.

This speaker aroused much controversy by suggesting a revival of the old prewar custom of junking obsolete or near-obsolete units taken in trade, and that the manufacturer make an allowance to the distributor for each scrapped unit after the necessary certification. AED members declared that the equipment industry was far from any such need, but that dealers would have to make realistic appraisals of old machines.

A new AED "Green Book" of recommended standard rental rates for equipment is expected to be ready by March.

(Continued on page 61)



★ Manufacturers' end of panel: H. W. RICHARDSON of Construction Methods, moderator; FRED SOLDITT Harnischfeger Corporation (face hidden); L. G. SCHAUB, Union Wire Rope Corp.; HAROLD REISHUS, International Harvester Co.; KENNETH LINDSAY, Iowa Manufacturing Co.; W. B. GREENE, Barber-Greene Co.; M. B. GARNER, Thew Company; JOHN E. CARROLL, American Hoist & Derrick Co.

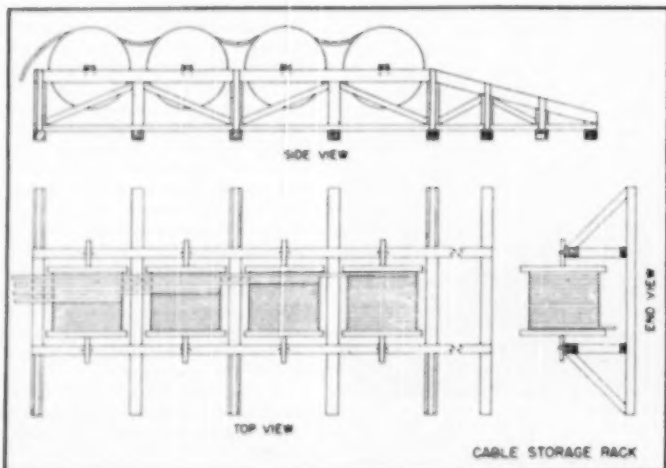
JOB and EQUIPMENT IDEAS



Concrete Shoes for Construction Lights

The gentleman fixing the lights is doing so for safe-guarding a section of torn-up street in downtown Milwaukee. The point of this picture is the use of concrete bases under these

lights, to prevent them blowing over or being easily kicked out of position. Each lamp is fastened to one or more bolts embedded in the base. This practice is used by the T.E.E.R. & T.C. which is the alphabetical name for the electric railway system in Milwaukee.



★ Handy gin pole and skid mounted on small asphalt plant—used by Oregon state highway maintenance crews in remote areas where asphalt is delivered in drums instead of tank trucks. Operated with a hand winch, enables a single worker to get a heavy drum up to dumping position with little effort

Safe Way to Store Cable Reels

The accompanying sketch comes from the Safety Bulletin, First Quarter 1949, published by the Office of the Chief of Engineers, Safety Division. It illustrates a simple method being used by the contractor on the Clark Hill Dam in the southeast.

The ramp at the end provides a means for getting the reel up on the rack where power handling equipment is not available. The reels are kept off the ground and the cable comes off straight without kinking or loosening of the strands. Where large reels are used it would be advisable to build a ramp at both ends, if empties are removed by hand. The height and width of rack, also the size of timbers, are determined by the size and weight of reels which will be stored.

"Do Not Start" Signs for Equipment

Sometimes there is danger that someone will try to start the motor and move a piece of machinery parked in the shop, yard or on a job, at a time when a man might be working under the machine or the machine is not in condition to start without damage to the motor or mechanism.

Use of the printed "Do Not Start" sign fastened at the controls is one

of the prize-winning ideas, which Peter Kiewit Sons' Co. recently received from an employee on this firm's Garrison Dam project.

The sign is painted on a piece of masonite. It has a battery clip attached to one side of it. When a man starts to work around or underneath a machine he clips the sign to the control lever.

Horn Tells When Truck is Loaded

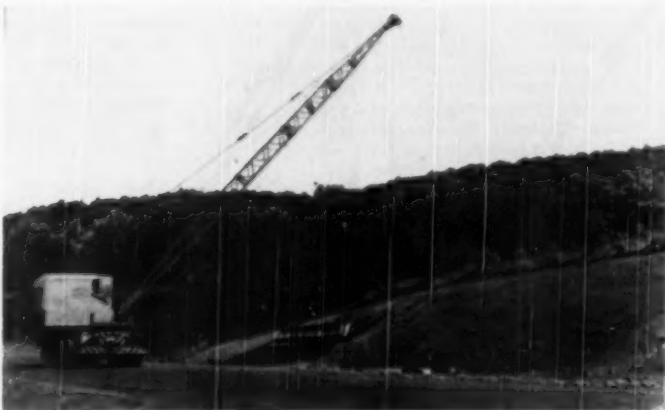
Another of the Peter Kiewit Sons' Co. "prize-winning ideas" published in this company's employee magazine is a device suggested by an employee for expediting the loading of gravel or rock from a hopper into trucks, during aggregate production.

The problem was to obtain accurate and fast weighing. It was solved as follows:

Metal contacts of brass or steel are made and attached, one to the scale beam and the other to the beam box. A storage battery and an automobile horn are hooked up in series to these contacts. Careful adjustment of the contacts is made so that as truck is loaded, scale beam raises, closing circuit and sounding the horn. The horn warning does two things—it tells the scale operator to stop supply from the overhead bin and it tells the driver to drive off with his full load. (The contacts should be set so that the horn starts to sound as the beam arm starts up, otherwise the load will be underweighed by a few hundred pounds.)

Trimming Backslopes with Motor Crane

White Oak Excavators of Plainville, Connecticut, use a rubber-tired crane (Lorain) to drag slopes on relocated U.S. No. 6, at Watertown, Conn. A special fabricated steel backfiller was used, providing fast, accurate grading.



Equipment Distributors Meeting

(Continued from page 59)

Advertising is a force which construction machinery people need to understand better and utilize more fully. National technical journals given plugs for their part in advancing knowledge and promoting industry causes. Distributors are urged to turn in more job photos and "case story" material to the manufacturers to help build acceptance for a machine.

Service is the whole reason for the distributor's existence.

Contractor Presents Viewpoint

The importance of a mutual understanding between contractors and distributors was told by Walter L. Couse, pres.-elect, Associated General Contractors of America. Mr. Couse, who is a Detroit contractor, told of the progress of the AGC-AED joint cooperative committee, and urged a continuing campaign in support of private enterprise. He took distributors sharply to task for selling equipment to government bodies at cheaper prices than to contractors, noting that this is "poor public relations" in any type of business that looks to private contractors for most of their business in the long run.

Mr. Couse reminded that the great construction industry—second only to farming—is affected along with the entire US by national trends toward shorter work days and work weeks, more worker vacations, earlier retirement and longer education periods. Greater productivity lies in more efficient management and more and better use of machinery. Wages can come only out of production.

Manufacturer-Distributor Panel

Some of the thoughts (all unofficial) expressed at the manufacturer-distributor panel meeting.

Sending of service man on long field trips with parts, is a common example of distribution service, but poses a labor cost problem.

Hour-meter as basis for warranty, rather than time limit, also suggested.

In the financing picture, it would pay to take the banker out to see modern construction work—he would be amazed at the features of various machines, especially as to portability which insures its wider usefulness.

The extreme popularity of the 1949 AED convention was achieved again this year by offering members a well balanced program and housing everyone under one roof (Stevens). The AED's convention committee consisted of Harry J. Hush, Griffin Equipment Co., N.Y., (chairman), F. J. Fitzpatrick, Parker-Danner Co., Hyde Park, Mass.; S. F. Laskey, Northwest Equipment, Inc., Fargo, N. Dak.; and S. J. Oechale, Metalweld, Inc., Philadelphia.

The manufacturers cooperated in the program through a special committee consisting of Fred Solditt, C. J. Haring, J. E. Carroll, R. K. Stiles, W. B. Holden, G. W. Iverson, J. C. Campbell, J. H. Yearling, W. E. Miles, K. E. Brunsdale, S. F. Beatty, Jr., and J. G. Swain.

Among the convention features was a large photograph exhibit of a half-century of equipment progress.

Pennsylvania Roads Dramatized in Sound Color Movies

To acquaint Pennsylvania with state highway department problems, and plans and policies for solving them, a 16mm sound and color film titled "Pennsylvania's Highway Story" is now available for exhibition.

Copies of the film are in each highway department district office which upon request of schools, business and civic organizations, clubs, churches, or other groups, will supply projector and operator without charge. A balanced highway program that will best meet the needs of all the people is described.

The film pictures actual highway conditions under today's heavy flow of traffic. Modern highways are contrasted with roads built in earlier years. The need for improvements is shown along with animated drawings that reveal where the highway dollar comes from and how it is spent.

This is the second film that has been made by the State Highway Department and the Pennsylvania State College Motion Picture and Recording Studio. The first film "Construction Ahead" shows road building in all its many phases from design to final completion.

Line Attachment Gives Close Bucket Control

Letter to Managing Editor C. T. Murray from Col. Vic Brown, Associate Editor of *ROADS AND STREETS*

THE following letter is published just as received, in the belief that crane and clamshell owners and operators would be interested in it.

"Dear Charlie:

"The other day I stopped off at Holyoke, Mass., to look over the hydro-electric raceway job being constructed by Daniel O'Connell's Sons, Inc., Holyoke, Mass., No. A. There were several interesting things happening on this rock cut job. One of the most interesting to me was the operation of two clamshell buckets—one with a truck-mounted crane, the other with a 1½-yd. crawler crane. The operators were doing things with the buckets that I had not seen done before.

"The truck crane was loading rock-spoil onto trucks. Out beyond the reach of the boom would be a load that the operator, Walter Rybski, wanted to pick up. Heretofore whenever this case occurred I'd always seen the operator swing rapidly and throw the bucket out, hoping to land it on the rock or spot he wanted to dig into. That's pretty tough on a bucket and the bucket teeth. Walter was not doing that. He swung the boom so it pointed toward the rock, then he would pull the bucket back toward the boom with the tagline. He released the tagline hold and the bucket swung like a pendulum way out past the end of the boom. Then as he dropped the bucket he would snub on it by using the tagline and the bucket would spot with just a light drop. You'd think there might be eggs in the bucket by the way Walter spotted it.

Spotted 'er Exactly

"Then, when he had the bucket loaded he hoisted it over the truck and without booming up or down, would place the bucket over the exact spot on the truck where he wanted to dump the load. If the bucket was crosswise of the body and he wanted it lengthwise, he turned it from the cab. He could turn, spin, snub, or cast the bucket directly

from the cab. When I asked him how he did it, he showed me an accessory called the Tag-Master.

"Further downstream a 1½-yd. machine was placing rock rip-rap on the channel side slope. The operator was spotting the rip-rap as much as 25 ft. out past the end of the boom by making a pendulum out of the bucket through operation of the Tag-Master. This was new to me so I got the accompanying pictures to show how the crane operator controls the bucket.

"In talking with operator Steve Ondros, he told me that he no longer needs a man in a gondola to clean corners or spot the bucket for him when unloading aggregate. He gets square into the corners of the gondola by rotating and snubbing the bucket right from the cab. On a trench job that was sheet-piled, he controlled the bucket down through the waling and bracing without having anyone to position the bucket. That's a big saving in both time and accidents.

Saving Old Pier

"Also on this raceway job, another crew was cutting 4-in. core holes at short intervals, about 2 ft. apart, crosswise along the bottom of the length of an old stone pier that supported a bridge which crossed the river channel. The pier was close to the raceway channel. A funny thing was discovered there. The old masonry pier was setting on 12x12 timbers as a foundation. Beat that one if you can.

"The holes were being bored so that 4-in. diameter steel bars could be run through them and be anchored into a new concrete footing that was being built. The concrete footing will rest on concrete piles poured in what appeared to be 3-ft. caisson holes. I never asked any questions about them. But that idea of saving the old pier—it was a high one—by hanging it on 4-in. round steel rods was new to me. The core holes were being drilled by a Sullivan oil derrick drill head, placed in a horizontal position.

"Another thing I noticed was that the contractor had installed hydraulic controls on three of the cranes. Leo Thomas, one of the operators, said he can work faster and a heck of a lot easier. He claims he does not wear himself out now like he used to as these controls have the "feel" of mechanical controls without the fatigue. Someday I'm going to have an operator show me how to handle a crane or shovel so I'll know more about this fatigue angle and the limitations of shovel and crane operation. I've run about everything else.

"So much for now, Charlie. Thought you'd be interested."

A study of vehicular speeds by the department of Civil Engineering at the University of Illinois indicates that the use of speed signs is practically useless.

Drivers, it was indicated, do not operate by the speedometer, but by the conditions they meet and pay little attention to what speed limits are posted. The present posted speed limits are ineffective because they are unreasonable, it was pointed out. Their removal would have virtually no effect on traffic and would save large sums.



★ Left: Clamshell cast straight out with the Tag-Master. Right: Clamshell bucket pulled back

Triaxial Testing: Its Adaptation and Application to Highway Materials

PART I—Method of Testing Disturbed Soils and Flexible Base Materials

By Chester McDowell

Senior Soils Engineer,
Texas Highway Department, Austin

INTRODUCTION TO PART I

DURING the last two decades much has been done in our own state to show that the soil constants and other identification tests have an important relation to the engineering properties of soils. Nevertheless, the heavy loads imposed on our roadways just prior to and during World War II made it clear that additional testing techniques and equipment were sorely needed. In seeking a solution to this problem a study of the "Triaxial" or "Confined Compression" was made. Although much had been published regarding such methods, it was soon discovered that the available testing equipment was wholly inadequate, too expensive, and very cumbersome. In addition, few, if any, of the existing methods were developed to test disturbed granular soils such as flexible base materials. After an extensive investigation, the triaxial method has been adapted to the testing of various materials so that test results are readily utilized and testing equipment is relatively inexpensive. The test has already shown considerable merit in the testing of disturbed soils for subgrades, flexible bases, and undisturbed cores for bridge foundations.

This article stresses the fact that the results of strength tests on soil materials are strongly influenced by inherent quality, density, dry curing, and confinement during absorption. A triaxial compression test procedure has been developed on the basis of studies pertaining to these factors and on the premise that the conditions and influences, which produce important effects on the load carrying capacity of actual structures in the field, should be reproduced or simulated in any valid laboratory test procedure. This principle is important whether applied to a laboratory test procedure or to

loading tests on existing structures or large scale field test sections which are intended to check the validity of laboratory tests.

In the following pages, the factors which we are convinced should be given more than the usual attention are described under the general headings: Inherent Quality, Density, Dry Curing, and Confinement During Absorption.

DISCUSSION OF FACTORS

Inherent Quality: The innate quality of disturbed materials is the most important factor involved. Fortunately, there is available on this subject a considerable fund of information in which the use of the soil constants frequently is recommended. These tests are very useful but, in order to investigate the effects of densification, moisture control, coarse aggregates and the characteristics of layered soil systems, strength tests appear to be necessary.

The interest in triaxial testing is increasing in Highway Departments, especially in Texas. More than one-third of our 29 District and Expressway offices are being equipped to make such tests. It appears, therefore, that the subject is timely. This is the first of a series of three articles on triaxial testing. Part I covers the method of testing disturbed soils and flexible base materials and will discuss the influence of construction features on pavement behavior. Part II will cover the application of triaxial test results to the design of flexible pavement. An example of the application will be shown. Part III will include the sampling and triaxial testing of undisturbed soil cores and an application of such test results to bridge foundation problems.

These articles are written under the authorization of R. J. Hank, Chief Engineer Operations, whose guidance and encouragement are gratefully ac-

Density: Results of strength tests shown in Table I indicate clearly that additional compaction of flexible base materials is accompanied by increased strength. However, there is justification for concern about the under- or overcompaction of clay soils as will be shown later. In spite of much available information on this subject, it is difficult to devise a laboratory method of compacting specimens for strength tests which will represent the probable conditions obtained under present construction practice and at the same time be susceptible to controlled variation in the orderly investigation of possible improvement in construction practice.

Compaction Tests Evaluated

Studies of compaction procedures for strength tests have led to the following conclusions:

1. An impact method for compacting specimens is to be preferred to direct compression methods, because it appears to produce fairly homogeneous specimens whose structural characteristics approach those resulting from construction methods.

2. In cases where materials consist

knowledge. Many of the personnel of the Texas Highway Department, too numerous to name here, have assisted. Special recognition is due to: Soils Engineers W. H. Moore, J. E. Hunt, H. A. Meier, F. H. Seriner and A. W. Smith, and to Research Specialists Cecil Middleton and L. T. Elmore, for their very generous contributions. The combined efforts of these and many others over a period of several years have made possible the writing of these articles.

Reprints: Publication of Parts II and III is planned for March and April ROADS AND STREETS. If there is sufficient demand the series will be reprinted—single copies 50 cents, quantity lots quoted on requests for use by engineering colleges, highway departments, etc. Please give us an idea of the number of copies you might want. —Editor.

★ Table I and Fig. 1

of soft aggregate particles or clay soils, reworked specimens are not duplicated by test specimens molded from individual portions of a sample. This is because the soft aggregate particles

break down into smaller sizes and the clays form dense residual lumps as a result of the reworking. Since strength test specimens are not made from reworked material, it is believed that moisture-density specimens, intended for guidance in making strength test

specimens, should not be reworked but should be made from individual portions of the sample.

3. The total material should be used in making density and strength tests whenever possible because the presence of coarse aggregate almost in-

| Ultimate Unconfined Compressive Strength | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Soil | Custodian | Crushed Plastic Ball | Comminution Data | Churning Date | From Sub-jected to Capillary | Tested as Molded | Tested After: Capillary: No Churning | Tested After: Soaking | Strength at Ultimate | Strength of Dry-Charged Material: Proceed as a Percentage of the Strength of Sample | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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variably increases the strength of well graded flexible base materials. In certain cases where base materials contain very high percentages of coarse aggregate, it may be impossible to compact the *total material* so that the density of its minus $\frac{3}{4}$ -in. portion will be as much as 90% of the standard AASHTO maximum density which has been determined on the minus $\frac{3}{4}$ -in. portion alone, regardless of the amount of compactive effort applied to the total material.

4. In making strength test specimens the thickness of compacted layers should be given careful consideration. Naturally, where materials containing coarse aggregate are to be tested, the thickness of each layer should be at least as great as the diameter of the maximum size aggregate. Since most standard flexible base materials specifications require that all material shall pass the 2-in. screen, 2-in. has been selected as the maximum aggregate size for testing purposes. When specimens of such materials are to be tested, it is necessary that each layer be at least 2-in. depth.

Heavy Hammer Preferred

5. Where the standard 5½-lb. hammer with a drop of 12 in. was used for compacting some granular materials and clay soils, it was found that the usual thickness of compacted layer (1.5 to 2 in.) was too great to permit

| Lab. No. | County | Hwy. No. | Description of Material | Density Lb./Cu. Ft. Dry | | | | Before Molding | |
|---------------|--|--------------------|---|-------------------------|------|------------|--------|----------------|--------|
| | | | | Field | Lab. | Compactive | Effort | | |
| | | | | No. Tests | 6.63 | 13.26 | 14.80 | PI | % S.R. |
| 69-4-R | Lampson | 193 | Caliche & Limestone with Soft Sandstone | 126.8 | 1 | | 127.0 | 7 | 41* |
| R-1 thru R-10 | Williamson | 79 | Clay-Gravel Plus Waste Lime | 128.9 | 5 | | 128.2 | 8 | 28 |
| L-1 thru L-3 | Llano | 29 | Granite Gravel Plus Waste Lime | 128.0 | 10 | | 127.6 | 11 | 25 |
| 48-29-R | Bexar (San Ant. Expressways) UGI 1083(5) | | Crushed Rock Subbase from Rabke Pit | 129.7 | 48 | | 128.0 | 12 | 27 |
| 48-40-R | " | | Crushed Rock Base from McDonough Pit | 137.1 | 34 | | 133.5 | 8 | 29 |
| 48-21-R | " | | Leon Creek Gravel-Sand Admin Subbase | 142.4 | 32 | | 141.9 | 13 | 31 |
| 39-11-MR | Travis | 20 | Black Clay (Gumbo) | 92.0** | 3 | 92.0*** | 98.5 | 45 | 98 |
| 47-471-E | Williamson | Old U.S. 81 Hwy 20 | Black Clay | 85.0** | 3 | 85.0 | | 37 | 97 |
| 47-136-E | Bastrop | 88 | Sand Clay | 115.8 | 15 | 111.5 | 114.9 | 6 | 98 |
| 47-143-E | " | " | " | 118.9 | 14 | 117.7 | 121.4 | 14 | 95 |
| 47-158-E | " | " | " | 117.1 | 3 | 112.7 | 116.5 | 14 | 96 |
| 49-14-R | " | " | Crushed Stone | 126.0 | 4 | | 125.0 | 6 | 28 |

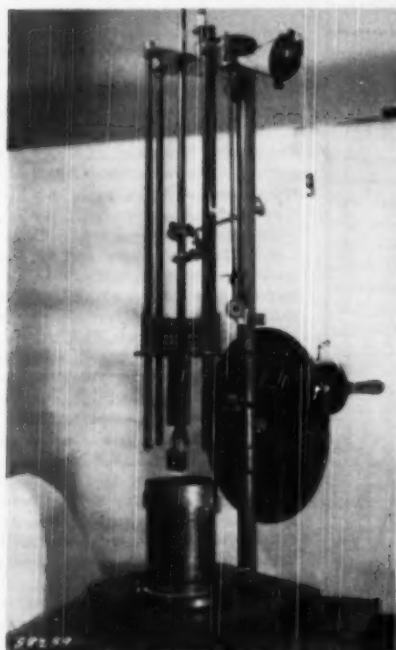
*Lab specimens and road samples contained from 48 to 50% soil binder after compaction, showing a similar breakdown of particle sizes for field and laboratory operations.
 ***Samples from old road subgrade after clay had consolidated or swelled so as to come to its final density
 **Standard AASHTO density = only 85 lb./cu. ft.

★ Fig. 2

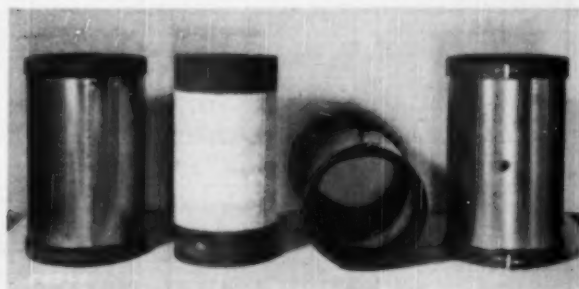
uniform compaction throughout each layer. The modified AASHTO hammer, weighing 10 lb. and having an 18 in. fall will produce reasonably uniform density throughout a 2-in. layer. Therefore, the use of the heavy ham-

mer is preferred for making strength test specimens.

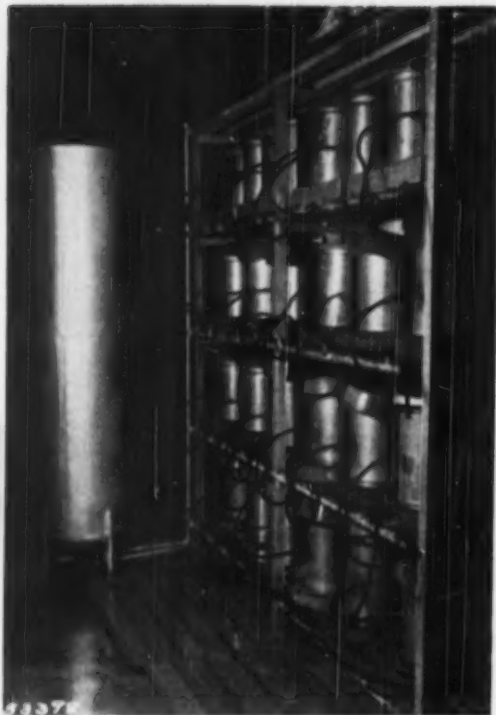
6. In testing granular materials, experience indicates that for general, practical use, a 6-in. diameter of specimen is the *minimum* that should be used. Also, it appears that a specimen



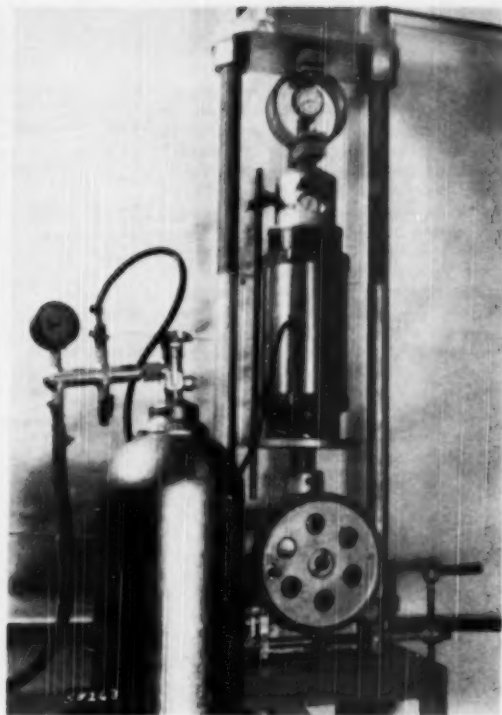
★ Fig. 3. Left: Compaction Device (Rainhart). Right: Fig. 4. (Top): Views of various size pressure cells, also cores before and after testing. (Bottom): 6 x 8-in.



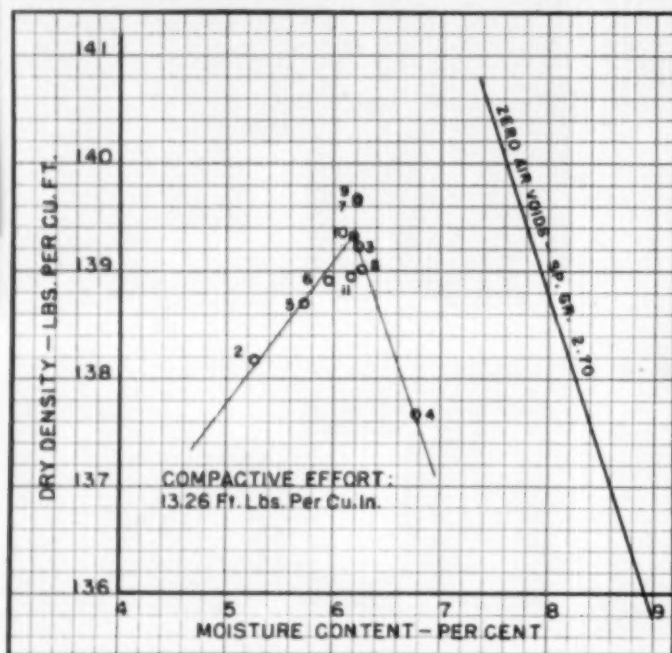
specimen capped with porous stones and several views of pressure cells for 6-in. diameter specimens



★ Fig. 5. Rack in moist room. Specimens subjected to capillary wetting, lateral pressure (from constant pressure manifold) and vertical surcharge (annular lead weights)



★ Fig. 6. Screw Jack Press with proving ring, deformation dial, surge tank, pressure gauge and accessories. Specimen in pressure cell ready for testing



★ Fig. 7. Moisture-Density relations. Lab. No. 49-1-R graded crushed rock with selected soil binder

height of 8 in. is adequate for all materials unless the friction is exceptionally high. However, for materials with exceptionally high friction, this height may introduce some error in test results. The effects of height have not been fully investigated but, so far, it appears that this error is small and that heights of specimens in excess of 10 in. will not be required.

7. To facilitate expression and comparison of various methods of compaction, compactive effort has been defined in foot-pounds of energy per cubic inch of specimen. By this means, the compactive energy exerted by the modified hammer may be expressed in terms of the standard AASHO compactive effort which is equal to 6.56 ft.-lb. per cu. in., when the standard, 4-in. diameter, AASHO specimen is assumed to be 5 in. in height before trimming. Therefore, in compacting a 2-in. layer of a 6-in. diameter specimen, 25 blows of the modified AASHO hammer corresponds to one standard AASHO compactive effort.

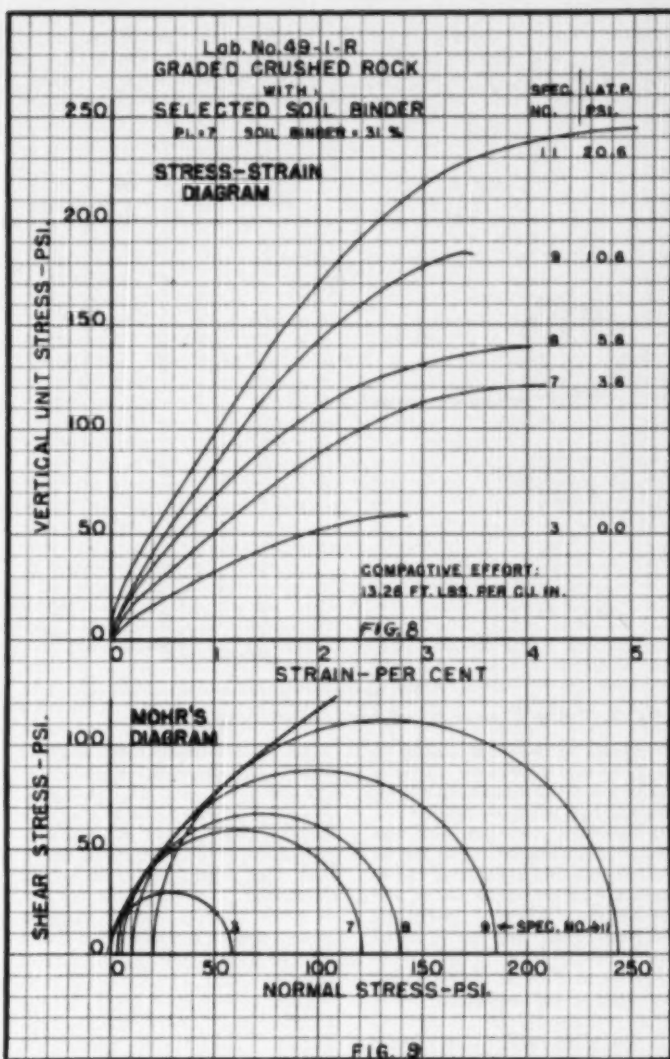
Identical compactive efforts do not necessarily produce identical densities when the energy is applied with different compaction devices to the same thickness of layer. The comparison of these compactive efforts is misleading

with regard to the density produced in specimens unless the depth of each compacted layer is properly adjusted. With a given compactive effort the heavy, modified AASHTO hammer, applied to layers of 2-in. thickness, produces greater densities than are produced by the standard AASHTO hammer applied to layers of 1½-in. thickness. It was found from trial that similar soil densities were produced when equal compactive efforts were applied by the standard AASHTO hammer to layers approximately ¾ in. thick and when applied by the modified AASHTO hammer to layers 2-in. thick.

High Compactive Effort

8. For routine investigations involving non-swelling soils and flexible base materials, experience indicates that a compactive effort equivalent to approximately twice that employed in the standard AASHTO test should be used. This is necessary in order to overcome the friction of the aggregate that resists adequate densification of the minus ¼-in. portion. This conclusion is based on the following: Samples consisting of soils and aggregate bearing flexible base materials were secured from a number of construction projects as completed. The density and moisture content of the material in place were determined. In the laboratory, the total material samples were remolded at various compactive efforts and moisture contents. The compactive efforts that correlated with the usual construction practice were found to be approximately twice the standard AASHTO effort (i.e., 13.26 ft.-lb. per cu. in.) for sand-clays or flexible base materials, and not more than the standard AASHTO compactive effort (i.e., 6.63 ft.-lb. per cu. in.) for highly plastic clay soils. See Table II. This is not to be construed to mean that sand-clays and flexible base materials should not be compacted to still higher densities than those usually employed because, in many cases, it may be both feasible and profitable to compact such materials to higher densities.

Where swelling clays from the upper layers of subgrade are to be tested, lower compactive efforts should be used. Usually, strength test specimens consisting of medium to high swelling clays should be molded at a density which is comparable to that produced with the modified hammer, in 2-in. layers, and at a compactive effort equivalent to six-tenths of one standard AASHTO effort as defined in Paragraph 7. This compactive effort may appear to be too low but, for clay soils, this procedure was found to produce initial densities slightly in excess of those obtained by the standard AASHTO procedure. Specimens consisting of swelling clays molded at the



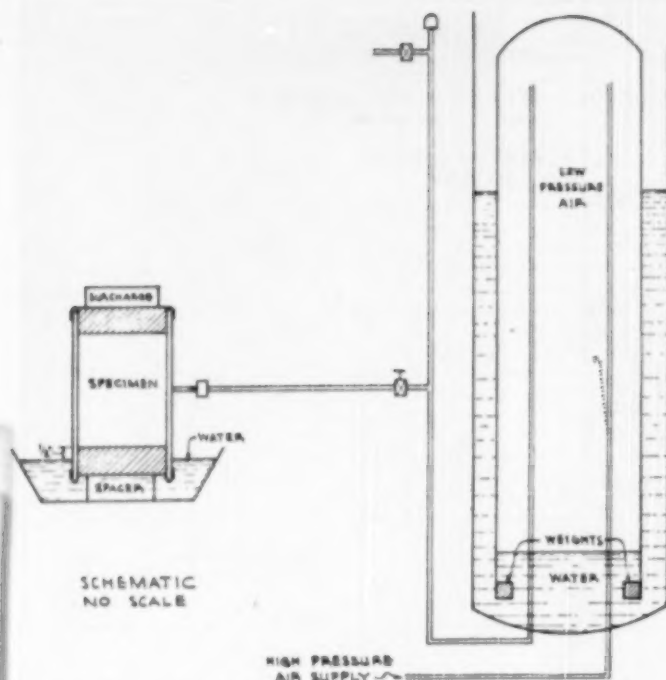
★ Figs. 8 and 9

optimum moisture content for the compactive effort proposed, and not permitted to dry prior to capillary wetting, usually produce low amounts of swell. Additional compaction does not result in greater subsequent strengths after saturation unless such specimens are loaded during wetting with surcharges much heavier than the weights

of pavements. This is because the swelling action destroys the high initial strengths of such dense specimens. If soils are compacted at optimum moisture and maximum density for lower compactive efforts the subsequent swell will be very low, but the subsequent strengths also will be low. Our studies of swelling clays indicate that at the time of sealing or paving



★ Typical cross-section of old pavement showing lip curb to be removed and trench dug in process



★ Fig. 10. Diagram of equipment used during capillary wetting

the control of moisture content is equally as important as the control of density in order to obtain a subsequent low swell, high strength condition.

In the case of clay soils with high volume change characteristics the desirable density for compaction can be determined by testing the soil at several densities. In order to investigate this point, tests were run on a soil with Plasticity Index of 45. When compacted at standard AASHTO optimum moisture and maximum density (87 lb. per cu. ft.) the strength of this soil after capillary wetting is represented by an angle of internal friction of 7° and a cohesion value of 5.1 psi. When compacted at the optimum moisture content for a greater compactive effort which produced a density of 90 lb. per cu. ft., the strength of the soil after capillary wetting was represented by an angle of internal friction of 11° and a cohesion value of 5.4 psi. When a third set of specimens was compacted at the optimum moisture for a still larger compactive effort which produced a density of 92 lb. per cu. ft., the strength of the soil after capillary wetting was represented by an angle of internal friction of 11° and a cohesion of 4.5 psi.

Over-Compaction Possible

From a comparison of these results

it can be seen clearly that the specimens molded at the intermediate density had the highest final strengths. This substantiates the belief that high swelling upper layers of clay subgrades can be over-compacted or, at least, high density sometimes cannot be retained. It has been observed that no extra strength can be expected from increased density of soil if the accompanying volumetric swell is more than 6% to 8%. This amount of swell through a thick layer would be very undesirable, but is unlikely to occur because of the restraint of surcharge loads.

The control of moisture during and following compaction will also do much to reduce the swelling properties of highly expansive clays. Tests to date indicate that volumetric swell of expansive soils can be held below 6% to 8% when the moisture content of the soil at time of paving is not more than 3% to 6% below the standard AASHTO optimum moisture content, and when the density is not more than above 7 lb. per cu. ft. above that of the standard AASHTO optimum density. Therefore, it is not practical to compact swelling clays from the upper layers of subgrade to extremely high densities in an effort to obtain maximum subsequent strengths.

Dry Curing: To date, most investigations involving strength tests on

laboratory specimens or field test sections fail to recognize any subsequently increased strengths brought about by the curing procedures used prior to wetting the specimens or sealing the test sections. At first this factor did not appear to be important except as a means for temporary hardening of the base just prior to application of surfacing. Research studies showed that all moisture removed by drying usually was replaced in time by capillarity, etc., and it seemed that no additional final strength would accrue from such a curing procedure. Nevertheless, some of our field forces contended that permanent effects did occur and that some few so-called "green" bases, consisting of materials commonly considered to be good, were stable when surfaced but failed to remain stable. It was further contended and demonstrated that some such bases when scarified, recompacted, and properly dry-cured before surfacing, served as satisfactory bases thereafter. These experiences focused the laboratory's attention on this factor which seems to be neglected by most other investigators. The results of our investigations confirmed the importance of the effects of dry curing on final strength.

In the laboratory investigation of the above described factor, unconfined compression tests were performed on crushed stone-soil flexible base material mixtures, as shown in Table I. As normally expected for the specimens made at optimum conditions, the moisture removed by drying was taken back into the specimens during capillary absorption. This being the case, the great percentage increases in strengths shown in the last column of Table I usually are not expected. Perhaps previous ideas have been based too greatly on moisture content alone which fails to measure all of the factors involved. Note that strengths of specimens of good flexible base material that were dry-cured prior to capillary wetting may be as much as 2 to 2½ times as great as the strength of duplicate specimens not dry-cured. Also, it may be noted that specimens made of a given material, at a relatively high compactive effort, are somewhat less affected by this factor than are specimens made at lower compactive efforts. This investigation was completed prior to the development of the compaction procedure proposed elsewhere in this report. Specimens 6 in. in diameter and approximately 6 in. in height were molded with the standard AASHTO hammer (5½ lb. dropped 12 in.), in three layers, at either 110 blows per layer (2 x std. AASHTO effort) or 165 blows per layer (3 x std. AASHTO effort).

Dry Curing Effect

The data presented here indicate that any strength test performed on laboratory specimens consisting of granular soils and flexible base materials should recognize the effects of dry curing, unless the project under consideration is to be built under emergency and/or extremely humid conditions, a situation which seldom occurs [in Texas]. Also, it is believed that the strength of test sections built for field loading investigations are strongly affected by the drying factor. Many extensive investigations of field test sections have been performed without introducing the drying factor herein described and may have resulted in creating false impressions relative to the wheel load carrying capacities of many materials. Inasmuch as strength tests probably will be used as a means for determining the quality and depth requirements for subgrade and base materials, it is highly desirable that the properties measured in the tests be as nearly representative as practicable of those developed by good, sound constructive methods. Any great deviation from this ideal may delay or even defeat the development of satisfactory strength test procedures.

Confinement During Absorption: Since all layers of subgrades and bases have lateral support from adjacent areas during moisture accumulation, it was considered advisable to investigate the influence of this factor on strength tests. It was found that the strengths of some materials were affected greatly by small amounts of lateral pressure during absorption. Our information on this subject is too limited at present to identify the materials that may or may not be affected by this factor. In one case, strength tests made on a sand-clay soil, having a PI of 6, showed that the compressive strengths of the specimens wetted under the influence of 1 psi. lateral pressure were twice those of specimens wetted while unsupported. The effect on strength produced by various intensities of lateral pressure have not been determined. At present, we are using a lateral pressure of 1 psi. around the periphery of the specimen during capillary wetting. This is approximately equivalent to the hydrostatic pressure of soil at rest, at a point 12 in. below the pavement surface. An appropriate vertical surcharge, usually $\frac{1}{2}$ to $1\frac{1}{2}$ psi., also is applied to the specimens.

ADVANTAGES OF TEST

Having arrived at a method of preparing specimens, the testing of these specimens will be discussed next. A triaxial compression test has been

chosen for the following reasons:

1. Triaxial compression test results will distinguish certain characteristics of soil materials that are not revealed by unconfined compression tests alone. Sands and clays often have similar unconfined compression strengths but radically different compressive strengths when slightly confined.
2. The test results are in terms of combined stresses that are applicable to many of the equations that have been proposed for use in the solution of soil mechanics problems.
3. Test results are not affected by the restraint of molds. The membranes used offer slight restraints which are taken into account by proper calibration.
4. Relatively large size aggregates can be included in the materials to be tested without resorting to extremely large size specimens. This reduces the weight of equipment and materials that otherwise might be required.
5. To date, the test results appear to be in line with field experience.

As a result of the previously described investigations, together with many other experiences with strength tests, a test procedure has not been developed. The procedure is not considered to be entirely out of the development stage, and the investigation of application of test results to actual problems is not complete.

TEST PROCEDURE

The following is a summary of the procedure and equipment proposed. A more detailed procedure is shown on pages 498-506, Vol. 26, 1946 *Proceedings Highway Research Board*.

1. Secure and air-dry a 200 to 300 lb. sample of material.
2. The material is prepared by breaking up clay soil lumps to pass the $\frac{1}{4}$ -in. screen and accurately subdividing the sample so as to obtain numerous identical portions of the material for molding. In cases where extreme accuracy is desired, samples are separated into suitable sizes and recombined in exact, weighed amounts representing the original material.
3. A weighed quantity of water which, added to the determined hygroscopic moisture, will provide a chosen final moisture content is mixed intimately with a weighed quantity of the material. Care is taken to saturate coarse aggregate particles. Materials containing impervious clay lumps are stored overnight to permit equalization of moisture distribution.
4. Specimens of 6-in. diameter by 8-in. height are compacted in four equal layers of 2 in. thickness, each. The total batch described in step 3 is used to form one specimen. By means of the Modified AASHO hammer, see Fig. 3, a selected number of hammer

blows, depending upon the characteristics of the material and its proposed position in the field, are applied to each layer. Under these conditions, 15 blows per layer usually will be required for swelling clay soils and 50 or more blows per layer for sand-clays or flexible base material. The tops of all except final layers are lightly scarified in order to increase the bond between layers. The final, upper surface is carefully levelled. The densities obtained in this manner are consistent with good field practice. See paragraph 8 under previous discussion of "Density."

5. The dimensions and weight of specimens are determined at this stage so as to obtain an estimate of dry density. The data for a fairly accurate moisture-density curve may be obtained in this manner by compacting specimens at various moisture contents. See Fig. 7. Since this method of test does not call for trimming off the top of the specimen, the approximate dry weight is known. Therefore, moisture-density relations accurate enough for field control can be estimated at time of molding. However, it is desirable to dry the entire specimen in order to obtain an accurate final check on the dry weight and the moisture content at all stages.

6. Six specimens, as nearly identical as possible, are compacted in steel molds at the optimum moisture content for the selected compactive effort. (Sets of specimens from the dry side or wet side of the optimum moisture curve, also may be made.) All specimens are measured and extruded from the molds. Porous stones are placed on the top and bottom. See Fig. 4. All specimens are protected from free or capillary moisture and stored overnight in the moist room.

Specimens Air Dried

7. Specimens consisting of materials that do not develop shrinkage cracks upon drying are partially dried by placing in an air-drying oven (forced draught at 140° F.) for a period of 8 hours. Upon removal, the specimens are allowed to stand overnight in the open laboratory. The specimens again are weighed. Usually, about one-third to one-half of the molding moisture is removed. Materials that tend to develop shrinkage cracks are not dried.

8. The axial cells, deflated by vacuum, are placed on the specimens. A layer of slitted filter paper, overlapping the upper and lower porous stones, should be wrapped around the specimen prior to placement of the cells. A suitable vertical surcharge (about 0.33 to 1.50 psi. for most subgrades) is placed on the top stone. The specimens are then placed in pans of water so that the water level on the

lower stone is $\frac{1}{8}$ in. below the bottom of the specimen itself. See Fig. 10. This assembly is then placed on the storage rack in the moisture room and connected with the constant pressure air manifold. See Fig. 8. The usual lateral pressure is one psi., which is adequate to prevent specimens from slumping under their own weight. The specimens are permitted to absorb water by capillarity until equilibrium is attained. The time required for capillary equilibrium ranges from a few days to several weeks, depending upon the rate of wetting of the material. At the end of this period the specimens are weighed and measured in order to determine absorption and swell and are ready for testing.

The procedure, thus far, describes the preparation of specimens of disturbed materials. Some of the equipment used for testing undisturbed soil cores is shown in the upper portion of Fig. 4. If necessary, subgrade cores may be saturated as described in step 8. Details relative to sampling, trimming of specimens and interpretation of test results will be given in Part III.

9. Each specimen is tested in compression while subjected to a constant lateral pressure. The six identical specimens of disturbed materials are usually tested at lateral pressures of 0, 3, 5, 10, 15 and 20 psi., respectively. The other specimens that were made for the moisture-density curve are tested at one lateral pressure, usually 5 psi. The lateral pressures applied during the testing of cores from bridge foundations should conform as nearly as possible to the estimated stress conditions and usually will be higher than those involved in road bases. The lateral pressure is applied by means of the axial cells, supplied by an auxiliary air tank. Any suitable gear jack or testing press may be used to apply compressive stresses. Deformation is measured by a micrometer dial mounted along the central axis of the specimen. The rate of strain is 0.15 in. per minute. Simultaneous readings of load and deformation are taken at intervals of 0.01 in. deformation. Loading continues until the specimen fails. See Fig. 6.

10. After the completion of the compression tests, the entire specimen is dried at 110° C. On the basis of the total dry weight, extra data as to density, swell, moisture content, moisture absorption, etc., may be calculated.

11. From the test data, stress-strain curves are plotted. See Figure 8. Those who do not find it convenient to use a calculating machine to compute stress-strain curve data will find Mr. F. A. Harris' "Computoplot" to be of

much help. Mr. Harris developed the graphical method on the Houston Expressway work. From the principal stresses at the instant of failure, Mohr's diagram of stress is constructed. See Fig. 9. Values of cohesion and the angle of internal friction may be determined.

SUMMARY

The factors believed to exert major influences on the strengths of subgrade and flexible base materials, such as inherent quality, density, dry curing, confinement, etc., have been studied on the basis of field and laboratory results. It is believed that these factors are ever present regardless of how they are evaluated by tests, and

that their importance cannot be over-emphasized to those who are engaged in laboratory or field strength tests leading to a practical depth of base design method. It is believed that considerable confusion in interpreting results of such tests can be avoided by recognizing these variables. On the basis of our studies of tests for the determination of the strength of soil materials, the Materials and Tests Laboratory of the Texas Highway Department has devised a triaxial test method whereby these major influences will be properly evaluated. Part II will cover the application results from tests to design of flexible pavements; giving a specific example.

Heavy Construction Equipment vs. Highway Overload

By D. K. Heiple

Chief Field Engineer, R. G. LeTourneau, Inc.,
Peoria, Illinois

I HAVE read with considerable interest your editorial in the November issue of *ROADS AND STREETS* and certainly agree that there is a serious need for some basic thinking on load limitations for vehicles on our roads.

The big problem, of course, concerns itself with the trucking industry, however, there is a secondary issue involving the movement of construction equipment which should be given consideration at the same time.

We know that most construction equipment exceeds the size and weight limitations imposed by state highway departments. It has been our opinion, however, that weight limitations based solely on axle loadings do not take into consideration the whole problem. Operating tire pressures and gross tire-to-pavement contact area certainly are very important. A big, low-pressure tire spreading its load in low unit pressure over a big section of pavement will certainly carry the same or higher axle loadings as small, high-pressure tires with less damage.

For instance, a pair of 21.00 x 25, 16 ply equipment tires at 30 psi. impose about 35 lb. per square inch load on the pavement over a gross contact area of some 720 sq. in. with an axle load of 26,220 lb. or 13,110 lb. per tire.

On the other hand, four 9.00 x 20, 12 ply truck tires in a dual set up on one axle will carry 17,320 lb. (4,330 lb. per tire) at a tire pressure of 65 lb. This puts a load of some 70 to

75 psi. on the pavement over a gross contact area of 276 square inches.

It is difficult to estimate exactly what increases occur due to kinetic pounding at traveling speeds over these static loads, but certainly construction equipment moves, at 15 to 20 mph., have only a small percentage of the pounding effect of a highway truck at 45 to 60 mph.

We do know that the effect of speed is not a straight line proportion, but falls more nearly into an increase of loading by the square. Then the difference between 15 mph. and 45 mph. is not an increase of 3, but of 9 times. Even on a straight line basis, however, the difference would be considerable and it would seem that if an 18000-lb. axle loading is permissible at speeds of 45 to 60 mph., that axle loads of perhaps 36,000 lb. should be allowable for equipment traveling under permits at speeds of less than 25 mph.

Contractor moves, in relation to total volume of traffic, are almost a negligible factor, but they do today raise a question in many localities and the situation needs clarifying on a practical basis.

We feel that tire size and air pressure and speed of travel should receive equal consideration with axle loadings in highway weight limitations. The primary concern, of course, is the protection of our investment in highways, but we should also be careful not to raise their cost by unnecessarily penalizing the contractor in the conduct of his business. The taxpayers will bear the expense in both cases where the law is either too stringent or too lax.

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1949 Major Equipment Developments

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Shovels and Cranes

1

Electric Shovel: Marion

A Ward-Leonard all-electric machine was added to the line of excavating equipment of the Marion Power Shovel Co., Marion, Ohio. This 111-M Ward-



Leonard shovel is designed for heavy-duty service in the coal, quarry, metal mining and construction industries. As a standard shovel, the machine is equipped with a 2½-cu. yd. dipper and 33-ft. boom, while for coal loading service, the dipper capacity is 6 cu. yd. The 111-M Ward-Leonard is presented as a "sister" shovel of the 111-M Diesel machine, which was introduced into the medium-size excavator class almost three years ago.

2

Shovels and Cranes: Lima

Three new rubber tired machines—the Types 34-T, 34-M and 604-M—were announced by Lima Shovel and Crane Division of Lima-Hamilton Corporation, Lima, O. The Type 34-T is mounted on a truck chassis with independent power (two engines—one in the rotating assembly, which powers all shovel and



crane operations, and one in the truck, which is used for propelling the carrier). The Type 34-M differs from the 34-T inasmuch as it is a self-propelled unit with one engine mounted in the rotating assembly supplying the power for all operations including propelling in either direction. The Type 604-M rotating as-

sembly incorporates the basic features of the Lima Type 604, but with alterations to facilitate adaptation to truck mounting. Like the Type 34-M, one engine, mounted in the rotating assembly, supplies the power for all the operations.

3

½-Yd. Shovel: Quickway

An addition was made to the line of truck shovels and cranes of the "Quick-Way" Truck Shovel Co., Denver, Colo. The new Model "L" is a ½ cu. yd. power shovel, or 10-ton capacity crane, equipped with heavy duty 30-ft. folding-type boom. With additional attachments the unit is easily converted to trench-hoe, dragline or clamshell. Powered by an International U-9 motor developing 55 brake horsepower, the basic machine weighs 12,000 lbs. For rapid clamshell operation, cable speeds are the same on both front and rear drums when lagging is used on the haulback drum. Standard equipment includes drum lagging, hold-in clutch levers with the same operational function as "snap-in" or "toggle-in" clutches, and a combination power trip and automatic tagline winder. Five, ten, and twenty-foot boom extensions are available. Most basic parts are interchangeable with those on the "Quick-Way" Model "E".

4

Truck Mounted Shovel: Schield

A new improved Bantam, called the Model M-49, announced by the Schield Bantam Co., Inc., Waverly, Ia., is offered



with an independent spur gear drive boom hoist which permits the boom to be powered up or down, or lowered on the brake for fast operation. The model is easily converted from shovel to trench hoe, dragline, clam, piledriver, or crane. It mounts on any 1½ ton truck chassis or larger and is also available on half-tracks. Engineering features include Timken tapered roller bearing mounting of jack, drum, and swing shafts. Drums, swing gears, and vertical swing shaft roll on pre-lubricated, sealed-for-life ball bearings.

5

Truck Crane and Carrier: Northwest

A new truck crane and carrier combination was announced by the Northwest Engineering Co., 135 South La Salle St., Chicago, Ill. The crane has a capacity of 20 tons. The minimum boom length for crane work is 30 ft.—and this boom is extensible to 100 ft. length by addition

of standard intermediate sections. Main operating machinery of the crane is mounted on cast steel side frames. All high-speed shafts are mounted on ball or roller bearings. The "Feather-Touch" clutch control, which utilizes the power of the engine to throw heavy drum



clutches, uniform pressure swing clutches and a high-speed, power-controlled boom hoist, independent of all other operations, are standard equipment.

6

Crane-Excavator: Wayne

A new ¾ yd. crawler-mounted excavator, the Model 66, announced by the Wayne Crane Division of the American Steel Dredge Co., Fort Wayne, Ind., is easily convertible to shovel, dragline,



clamshell and a magnet or 7½-ton utility crane. The new crawler assembly was designed especially for this machine. It is powered through direct drive propeller shaft assembly from the new "direct power flow" transmission. The bearing length of the crawler is 8 ft. 5 in. with a width of 8 ft.

7

All-Electric Shovel: Marion

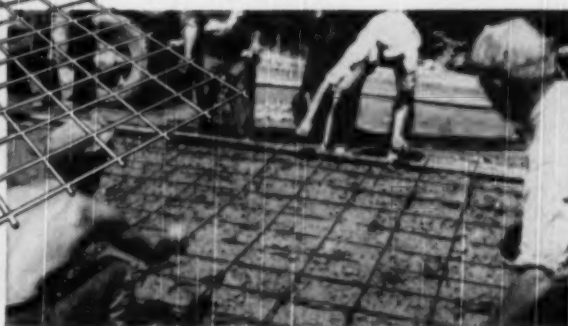
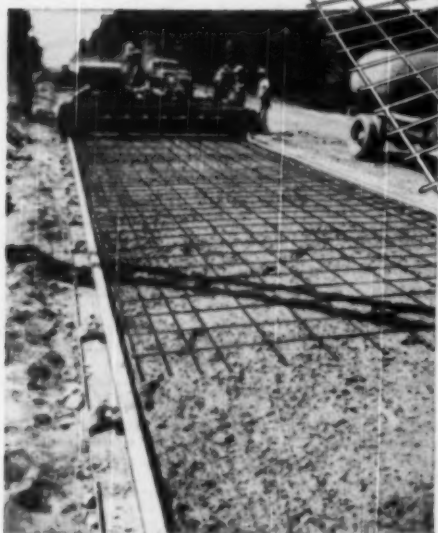
The new Marion 93-M Ward-Leonard all-electric shovel, announced by Marion Power Shovel Co., Marion, O., carries a 2½ cu. yd. dipper and 28 ft. boom as standard equipment. All motions of the





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Truscon Welded Wire Fabric used in U. S. Highway 51, Wisconsin (left below) and U. S. Highway 30, Pennsylvania (right below)



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new shovel are electrically controlled. The swing machinery is powered by a separate vertical motor, direct geared through two intermediate shafts to the main swing shaft, which is mounted on the upper frame structure. The hoist machinery is powered by a separate motor, first through a silent chain reduction to the intermediate shaft, and then through a single gear reduction to the drum shaft. A separate motor direct geared through an intermediate shaft to the shipper shaft supplies power for the crowd machinery.

Crane: Bucyrus-Erie

A new 22-B transit crane mounted on wheels was announced by Bucyrus-Erie Co., South Milwaukee, Wis. High speed job-to-job mobility and a sturdy working base are stated to be assured in the newly designed transit crane wheel mounting. The 142 h.p. Bucyrus-Erie mounting is built by Sterling for exclusive use with the 22-B transit crane. Wheel-base of the new mounting is 181 in. while the overall width of 8 ft. gives ample side clearance on normal roads. A full range of front end equipment is available for the new 22-B transit crane. It may be



converted in the field for shovel, dragline, dragshovel, clamshell or crane operation. In excavator service, the buckets and dipper are of $\frac{3}{4}$ -yd. capacity.

1 1/4 Cu. Yd. Excavator: Osgood

Its newly-designed Type 72, a 1 1/4 cu. yd. excavator and material handling machine, was announced by The Osgood Co., Marion, O. Three models are available: The Model 720, a shovel, dragline, clamshell, crane or hoe, with all front end attachments interchangeable; the Model

725 Mobilcrane, and the Model 727 dragline, clamshell or crane. Redesigning of several of the features of the Type 71, predecessor to the Type 72, has resulted in making a good machine better. These improvements include a new type crawler unit, with each tread belt independently controlled, and the addition of the new



Osgood type hook rollers. The Model 725 Mobilcrane is a one-man-operated, one-engine machine, mounted on a rubber-tired wheel mounted chassis. Index (Continued on page 96)

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- ☐ 83 Hydraulic Jacks
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| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |
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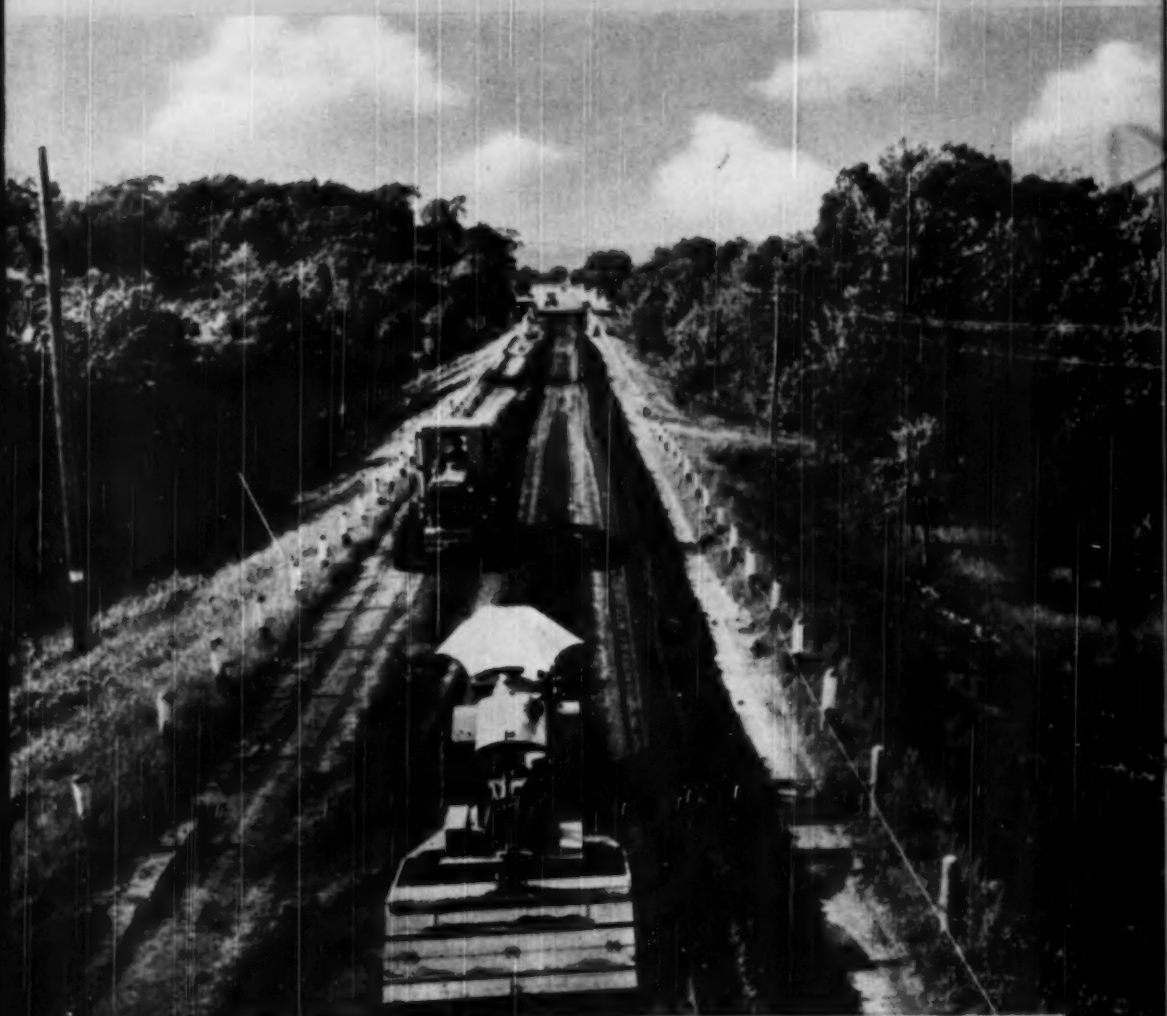
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Bituminous **ROADS AND STREETS**



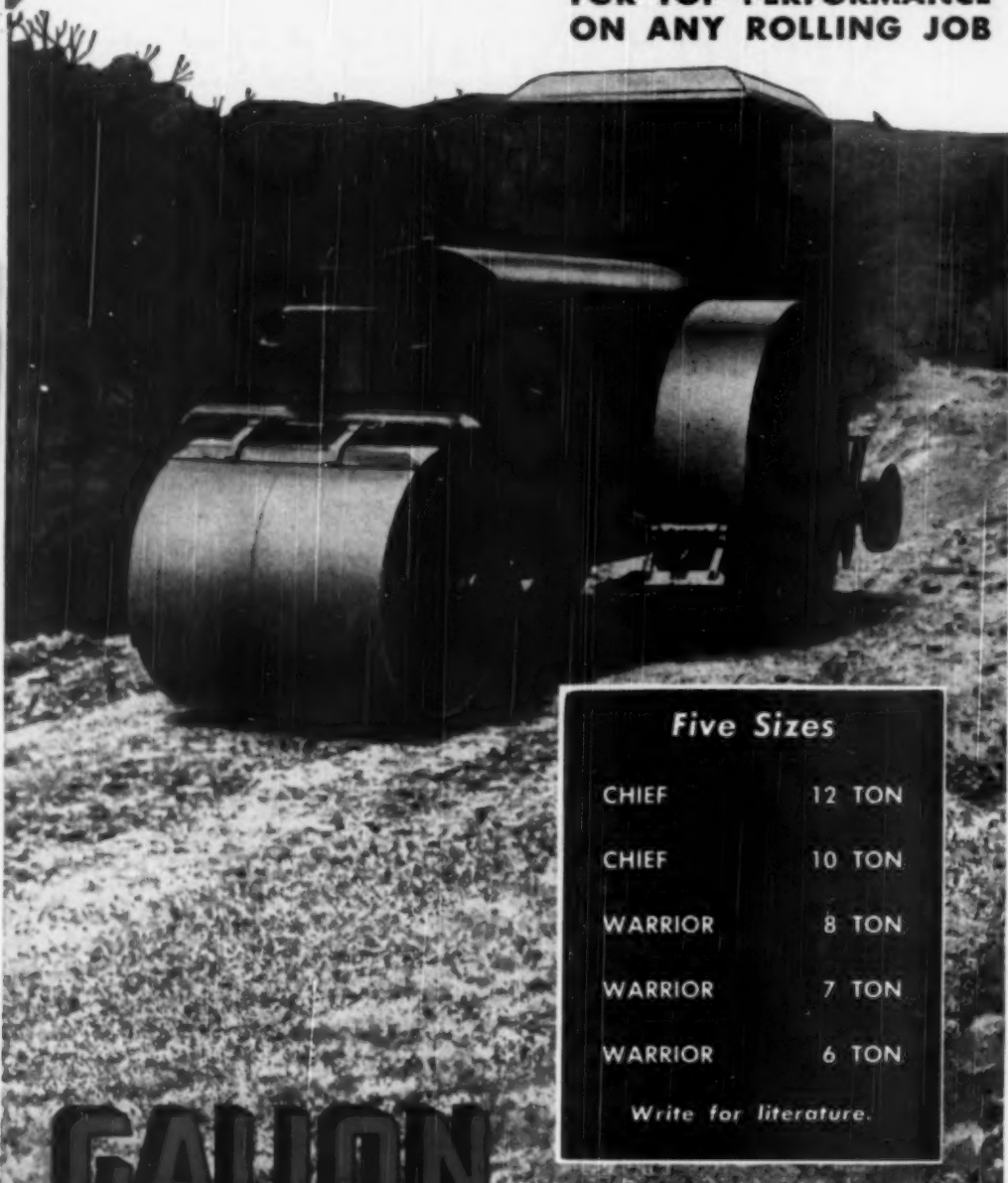
FEBRUARY, 1950

*Published by Gillette Publishing Company
22 West Maple Street, Chicago 10, Illinois*

Bituminous road-mix job in progress in Wisconsin, using modern motor grader and pulverizing mixer to insure uniformity. Photo courtesy Wisconsin State Highway Commission

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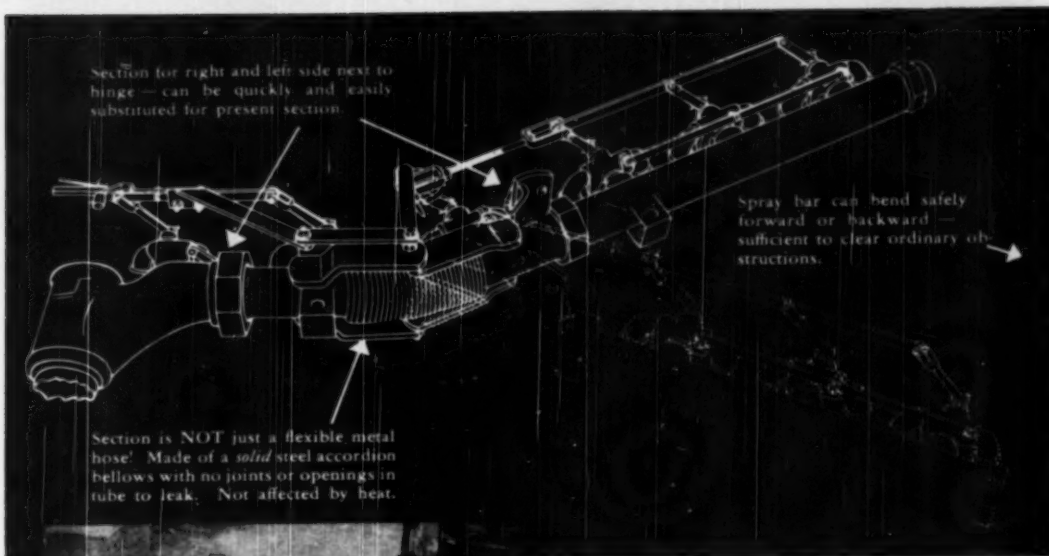
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ETNYRE RELIEVING SECTION FOR CIRCULATING SPRAY BAR PROVED BY FIELD TESTS!



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MONEY-SAVING FEATURES OF EXCLUSIVE ETNYRE DESIGN

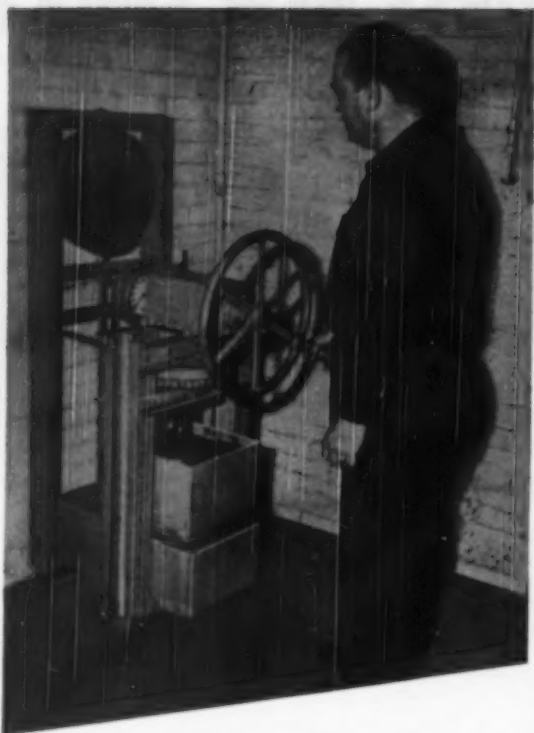
Performance on the job now verifies advantages of Etnyre's new relieving section for circulating spray bars! This is the famous spray bar that adjusts to crown of road . . . adjusts in height . . . shifts horizontally . . . folds for traveling . . . is quickly and easily extended . . . has controls which permit spraying from any part of the bar. Now, with the new, patented Etnyre relieving section, you have the most efficient spraying mechanism known to man. Relieving section is available on new Etnyre "Black Topper" or for installation on Etnyre Circulating Spray Bars now in use. Phone, write or wire for specifications and price,

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Orders for new "Black-Toppers" are coming in fast for delivery in 1950. If you wish to save time, reduce labor costs, avoid money-wasting breakdowns, and handle more types of bituminous work,

place your order soon to get delivery when you want it. Get information on Etnyre's new features, prices, and delivery schedule from your Etnyre Dealer or write us.



A 6-inch briquette of paving mix is tested on a Hubbard-Fields Stability Machine . . . to determine the shear strength of the compacted mix.

Penetration test determines the hardness of an asphalt cement.



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This 15-state area is served by Ohio Oil — a major source of asphalt for 25 years.



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1 Applying tack coat in amount of 0.1 gal. per sq. yd. of MS2 diluted with one-half its volume of water. This makes from 0.04 to 0.05 gal. of bitumen



2 Spreading hot sand-asphalt mix with a whirly spreader. A second and sometimes third spread is made totaling 8 to 12 lbs. per sq. yd.

How to De-slick

AN OLD BITUMINOUS ROAD

A METHOD of increasing the skid resistance of old asphalt surfaces has been developed by the Ohio department of highways. In use for several years, a variant of it was described in October, 1944, *ROADS AND STREETS*.^{*} Because of the continuing need for such information, the method is reviewed again herewith.

Essentially the procedure is to spread a hot sand-asphalt mixture thinly with a spinner-type chip spreader, at the rate of 8 to 12 lb. per sq. yd.

The method is apparently quite economical and, since it is gaining ground, it is described in some detail. The old surface is given a tack coat usually MS2. The hot sand-asphalt mixture is

spread in one, two or sometimes three applications. It is lightly dragged promptly after each application by the use of a 6' x 12' piece of wire mesh guard rail pulled over the surface with a light truck, tractor or sometimes by automobile. After several times over with the drag the next application is promptly applied.

The dragging spreads any little piles of loose material that may have fallen on the surface; also, it aids in smoothing a rough road surface. However, with so thin a course, the smoothing effect is limited. As soon as the last application is dragged, the road is opened to traffic, which compacts the mix. The road is never closed to traffic. However, although not imperative, it is preferable that the traffic be kept to a reasonable speed for several hours to avoid "whip-off."

A rubber-tired roller is sometimes used to roll the edges where traffic does not compact the surface promptly. If the traffic is very light or the weather is cool, so that the mix will not be properly compacted while hot, this light rolling is more necessary. However, where traffic is heavy in hot weather, traffic alone does a satisfactory job of compacting.

The MS2 tack coat is sometimes diluted with about one-half its volume of water and applied at the rate of 0.1 gal. per sq. yd., thus making 0.04 to 0.05 gal. bitumen per sq. yd. Since often the principal purpose of the thin seal is to deslick the old surface, it is imperative that a minimum of asphalt be used in the tack coat. This work can be done most satisfactorily during hot summer weather.

78

3 Lightly dragging the sand-asphalt mix with a piece of woven wire fence 6' x 12' for its smoothing effect

4 Rubber tired roller is sometimes used on edge of pavement. No rolling other than this, as traffic compacts the mix during hot weather

5 Sometimes the last application is made only over the center of the road



^{*}"Ohio Roads 'Skid-Proofed' with Thin Rock Asphalt Treatment," by H. D. Metcalf, Chief Engineer, Bureau of Maintenance, Ohio department of highways.



★ One White Construction Co. job, hot-mix equipment consisted of two Barber-Greene finishers, a Gallion 3-wheel roller, a Gallion tandem, and a Huber tandem. White trucks delivered hot-mix from a commercial plant

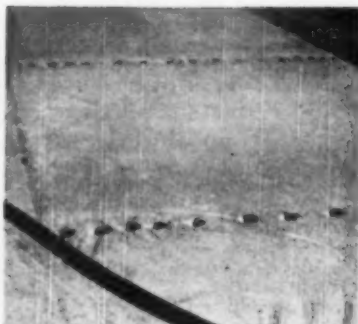
Hot-Mix Recap Methods Seen on

RESURFACING of portions of busy 4-lane-divided U.S. 41 between Milwaukee and the Illinois-Wisconsin state line continued during 1949. Three contract sections totaling 32.5 miles of highway were completed—north-bound, south-bound or both sides. This work is part of a program begun in 1947.

Payne & Dolan of Milwaukee finished a 9.5-mile and a 6.0-mile section; White Construction Co. of Chicago, had a 17.0-mile job. Accompanying photographs, taken on two jobs, are typical of the methods employed. Extensive areas of old pavement were removed; gravel and broken pavement materials were placed and compacted



1 Base areas to be broken out and replaced were marked with chalk, and holes drilled to help insure a neat break line. Payne & Dolan job. (Metal-weld 210 compressor and Ingersoll-Rand breaker)



2 Power "buster" then came along. Machine pictured is a Novo unit, thrust arm fitted with a special cleaving head which fractures the pavement with minimum vibration and disturbance

80

3 Old base material was removed by a Unit shovel whose weight and power came in handy for this work. Several loosening passes sometimes were necessary prior to loading





4 The excavated base-patch areas were backfilled with 2 to 3 in. layer of pavement fragments and imported sand, the sand being dumped alongside and shoveled into place manually. (International K8-7 truck with Gallien body)



5 Base prepared, forms in place using regular steel road forms for all but shortest patch areas. (Smith mixer mounted on Diamond T truck. Consumers Co. supplied 25 to 28 loads of concrete per 8-hr. day, averaging $4\frac{1}{2}$ yds. and hauling 11 to 17 miles)

U.S. 41 Milwaukee-Chicago Route

by hand for a 2 to 3 in. depth to afford a uniform subgrade; 9-in. concrete slab was constructed using ready-mix; and hot-plant-mixed asphaltic concrete was placed in three courses.

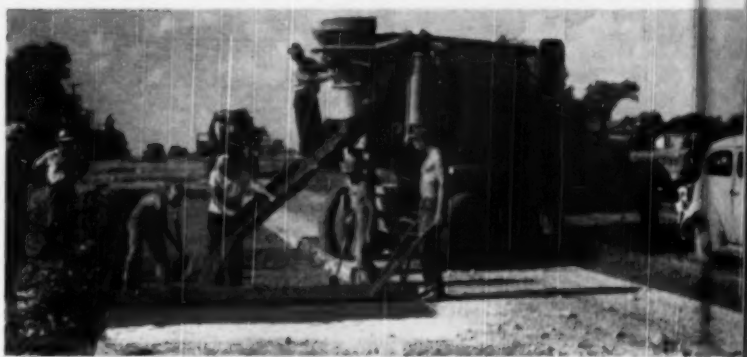
Concrete base patching progressed at the rate of 500 sq. yd. per 8-hour-day on the Payne & Dolan job.

Bid items included 82,000 sq. yd. of base patching, bid by both contractors at \$7.50; 39,500 tons crushed stone base at \$2.25 to \$2.90; and 113,000 tons of bituminous mix.

39 Bids on One Job

Recently contractors tendered 205 bids for 21 road projects in North Carolina, one job being a bypass project receiving 39 bids. Prices averaged about 11% below estimates.

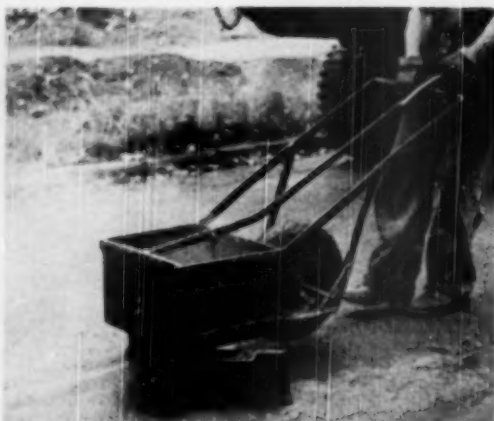
7 Finishing was done with two men using floats. Burlap cover for 24 hours



6 "WPA type" screed was the sensible solution for small patches (Rox mixer on a White truck)

8 Final rolling on the White project. Three courses were placed consisting of 140 and 150 lb. of $1\frac{1}{4}$ -in. max. binder mix totaling 3 in. compacted thickness, and a 1-in. layer of surface course using $\frac{3}{4}$ -in. max. material





★ A flush cart is part of each crew's equipment. Shown here in operation on an urban highway connection—wheel slightly raised, valve open to let some asphalt out, operator walking backward dragging the rubber belt to smooth the seal

Ten Patching Crews

Keep Oregon's Pavements Repaired

How 25-man crews working with portable "hot stuff" plants, placed 155,000 tons of mix in 1949

By E. A. Collier

Maintenance Engineer,
Oregon State Highway Commission, Salem

OREGON believes in prompt repair of pavement to secure constantly smooth riding qualities and to preserve original investment. There are about 400 miles of concrete pavement, 790 miles of asphaltic pavement and 1460 miles of bituminous macadam on the state highway system.

The Maintenance Department oper-

ates ten portable paving plants during a season of about six months each summer. These paving crews keep the highways smooth by patching depressions and strengthening weak spots and have performed a small amount of paving and street repairs for some of the cities. In 1949 they placed 155,000 tons of plant mix at a cost of \$8.57 per ton. In addition, section crews place penetration and cold mix patches on all breaks as they may occur throughout the year.



★ Patch being smoothed by a raker, and roller operator starting on the edge of the patch

A paving crew of about 25 men consists of the foreman, plant operator, helper, kettleman, street foreman, rakers, shovelers, rollerman, flush coater, seven truck drivers, flagmen, watchmen and timekeeper. An experienced street foreman and skilled rakers are required to get a smooth patch. On some of the larger patches, we use a power blade and have secured good, smooth patches by this method.

Equipment, New and Old

The paving plants are quite portable and each plant can be taken down, moved forty miles, set up and be operating again within eight hours. Our smaller plants have averaged an 88 ton output each per day worked although some of them are twenty years old, and our new 1949 plant averaged 223 tons per 8-hour day. The new plant consists of two heating drums with a pug mixer and belt to load material into heating drums, and skips to load mixed material from pug mixer into trucks. Above the heating drums is a dust collector and the 200-mesh dust collected is returned to the mix. The plant has diesel power, and diesel oil is burned to heat aggregate.

The equipment for a crew includes

The kind of road people like to ride on—Summer or Winter



When hot Summer suns burn down, motorists appreciate the smooth non-glare surface of roads built with Tarvia® road tar. These roads are always pleasant to look at—pleasant to drive on. They harmonize with any landscape.



When Winter storms come, roads built with Tarvia® road tar are easier to keep open. That's because their black surface absorbs heat and you can use calcium chloride or sodium chloride on them without damage.

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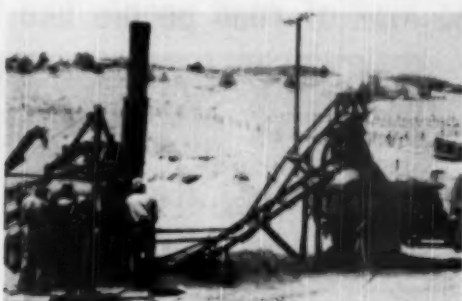
Tires get a better grip on Tarvia® road tar pavement. The slightly granular, "tractionized" surface gives them a firm tread-hold.

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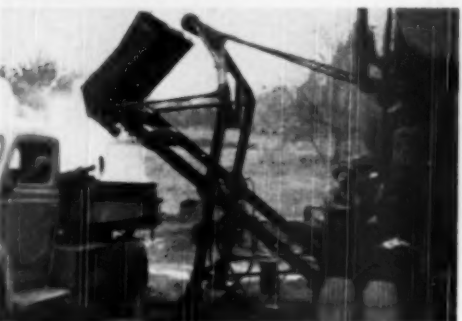
83



★ One of the older small-tonnage plants, still giving good service. (Left): Loading three sizes aggregate, stockpiled within 50-ft. radius. (Right): at other end of plant, loading hot stuff

★ One of the state's larger plants, 5 years old. Includes motor, fuel oil tank, dust collector, pugmill next to operator who handles all operations by compressed air. Combustion chamber and heating drum at far end. Note rack for delivering aggregate batch into plant's hopper

★ Other side of plant—second rack dumps prepared mix into waiting truck. (Right): A better view of the dumping rack, which brings a box of mix up the skids and tips to dump, as shown



a hot stuff plant; a 750-gal. asphalt kettle, a portable office with 600-gal. gas tank; a $\frac{1}{2}$ -yd. front-end tractor loader; six 3-ton trucks, one 5-ton truck, one truck with three 2000-gal.

semi-trailer tanks for asphalt; one 6-ton roller; two 200-gal. asphalt tanks for street crew; trailer for roller; one bus to haul crew; and two pickup trucks. The tractor truck with

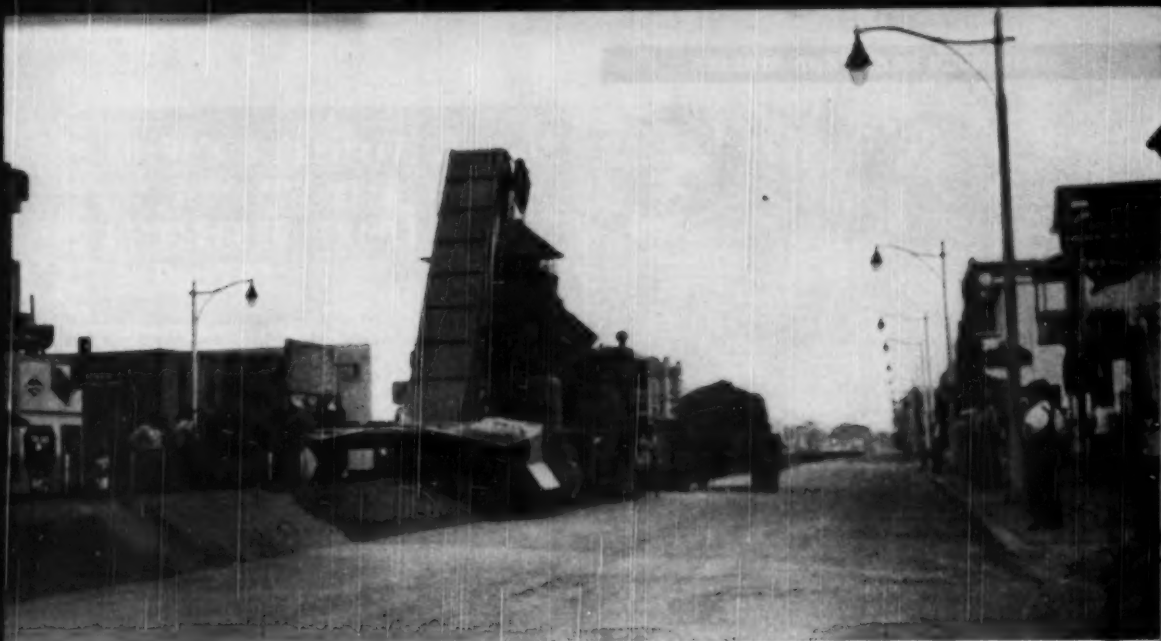
three trailer tanks serves two plants.

The rock and sand are stockpiled ahead, tested for size, and a dense mix designed in the laboratory with 6% asphalt. The asphalt is hauled hot from Portland each day in 2000-gal. state-owned trailer tanks. In more distant parts of the state, asphalt is barreled ahead of the setup. We use asphalt 85-100 penetration around Portland, and 120-150 penetration in other parts of the state for this type of work and heat the mix to 225°.

The older asphalt plants include five concrete-mixer-type, two-drum plants, ranging from 11 to 19 years old. Ma-



★ This equipment includes a street patching kettle, truck carrying asphalt in drums, and a truck dropping sand for seal cover



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AND
HANDSOME durable roads

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High building speed—Easier laying of asphalt, use of lighter and faster equipment, rapid setting of asphalt paving . . . all of these help to speed road construction.

Wide economies—Asphalt resurfacing offers a variety of savings. Faster jobs mean fewer man-hours and lower labor costs. Material expenses are at a minimum. Aggregate that is already on the road or close at hand can be used. Maintenance costs are low because the upkeep necessary for asphalt-resurfaced roads takes a minimum of time, labor, and materials.

Handsome, durable roads—The unbroken, black surfaces of asphalt provide both good appearance and riding comfort. Here, too, is durability that's hard to match. Asphalt and heavy aggregate, mixed, make strong road foundations. Top courses of asphalt, stone, and sand present long-wearing, waterproof surfaces.

• A Standard Oil Asphalt Department Representative can suggest economical types of asphalt construction to meet your needs and local conditions. You are assured prompt delivery of Standard Oil Asphalt from any of five large refineries located throughout the Midwest. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



STANDARD OIL COMPANY (INDIANA)





★ One of the Oregon state highway department's fifty front-end loaders: working three stockpiled stone sizes at a small plant

material is heated and mixed in these in both drums alternately. Also we have one double-heating drum with pug mixer, 10 years old, and three single-heating drum with pug mixer, from 4 to 6 years old. Our tenth machine, new in the Spring of 1949, is much the best, and has two heating drums with pug. The output and average cost per ton in place is as shown here:

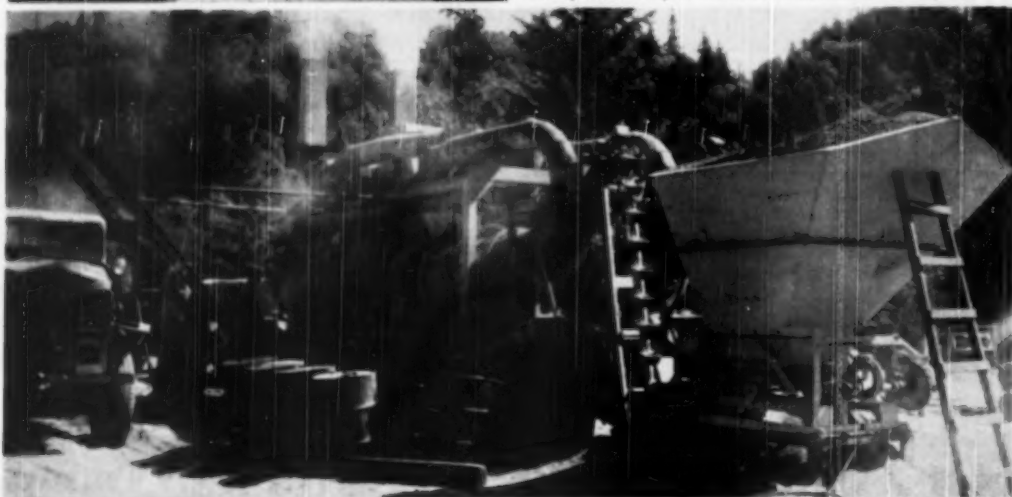
The average cost per ton for labor and equipment only was \$0.98 less for the new plant than for the next best

| | Pug Mixer | Total Tons per plant for Season | Average tons per day Worked | Average Cost Per Ton | Average Labor & Equip. only |
|-----------------------------|-----------|---------------------------------|-----------------------------|----------------------|-----------------------------|
| 5 Plants 11 to 19 yrs. old | No | 11,726 | 91 | \$9.56 | \$6.18 |
| 1 Plant 10 years old | Yes | 22,121 | 150 | 7.96 | 4.90 |
| 3 Plants 4 to 6 yrs. old | Yes | 17,188 | 118 | 8.29 | 5.61 |
| 1 Plant 1949—short season | Yes | 20,536 | 223 | 6.86 | 3.92 |
| Average cost for all plants | | | | \$8.57 | \$5.35 |



New Larger Capacity Plant

★ Newest 1949-model plant. From batch hopper material goes by two bucket elevators to twin parallel heating drums. Material is weighed between the hot bin and the pug mixer, then passes via skip to the trucks. Dust collector above plant



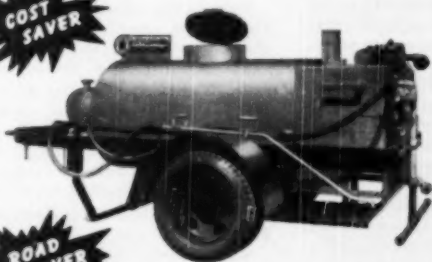
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WHY YOU NEED THIS
LITTLEFORD TRIPLE ACTION
No. 101**



Model No. 101
Utility Spray Tank using Hand Spray
for Patch Work.

This Littleford No. 101 Utility Spray Tank is not only a Time Saver, Cost Saver and Road Saver, but it is a combination of three units rolled into one. It has a Spray Bar for small application jobs, a Hand Spray for patch work and a Pouring Pot Outlet for crack filling work. When the Littleford No. 101 is on the job, the road maintenance crew can do almost all road repairs with this one piece of equipment. The 101 is efficient in operation, saves time and money, its use on Roads, Streets and Highways saves our transportation system. Be modern, use Modern Littleford Equipment.

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LITTLEFORD BROS., INC.

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and surface aggregates,
free-flowing bituminous
mixtures and plant mixed
stabilized soil.



**IT'S HERE!
Jaeger self-propelled
aggregate spreader**

Accurately Lays up to 10" Thickness, 8 to 12½ Ft. Widths: Four-wheel drive operates entirely on subgrade or compacted base — prevents displacement of newly-laid material. Long straightedge runners carry screed independent of up-and-down machine motion, average out subgrade irregularities, positively maintain correct course thickness.

Quick Width Changes: 10' to 12½' by telescopic shaft, screed inserts. Block off for 8' to 10'.

Blends Perfect Joints Between Lanes with blender wings and side control gates. Saves hand work.



Tandem Spreaders Lay Full-Widths up to 25', Ready to Roll in One Operation: Two spreaders cost much less than one big bituminous paver, double your daily production of base, permit earlier application of top and keep your higher priced paver busy finishing top course — at tremendous savings to you. Send for Catalog SPS-9, giving complete details.

Jaeger Bituminous Paver "Teams" with Jaeger Spreader.

America's most modern bituminous paver for high precision work—oscillating tiltable screeds, almost instant width adjustability to 12½', positive automatic leveling. Can pave flush to curb, gutter or previous lane. Confines all traction and heavy load to subgrade. Ask for Catalog BP-9.



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Use and Abuse of Seal Coats

How much of your surface treatment and sealing is done "hit or miss," or "rule of thumb"?

By C. V. Kiefer

Member, Engineering and Development Committee, The Asphalt Institute, Pacific Coast Division, San Francisco, Calif.

As the long morning shadows crept toward the base of the Ruby Mountains, erasing as they receded, the traces of October frost on the newly laid plant-mixed pavement, Isador Rich, the contractor, flourished his '48 Cadillac to a stop on the shoulder. As he stepped from the car,

with the heater purring full blast, he glanced toward the east and subconsciously noted the golden-leaved quaking aspens sprawled on the mountain slopes. Turning up the collar of his tweed sports jacket against the fall nip in the air, he made a mental note that he would have to crowd things to get the seal coat applied and the job accepted before winter.

At the approach of a red Chevrolet "pick-up" from the west, Izzy wheeled and flagged down Johnny Wise, the Resident Engineer.

"Mornin', Johnny," chattered Izzy. Johnny stumbled from his unheated conveyance and with numbed fingers

fumbled for a cigarette.

"Hi, Izzy," he replied.

With shoulders humped, hands in pockets and backs half-turned to the sun's faint warmth, the following conversation ensued:

Izzy: "Little crimpy this morning."

Johnny: "Yeah, sure is."

Izzy: "Guess I'd better get going on the seal coat while the weather holds out."

Johnny: "Yeah, guess you'd better."

Izzy: "How about startin' Monday? Guess we'll be ready by then. Finish plant work tomorrow."

Johnny: "Guess that's okay."

Izzy: "Okay to use 200-300?"

Johnny: "Yeah, guess so. The specs include it."

Izzy: "I figure I'll have about 6000 gallons left in the pit. How much more will we need?"

Here Johnny digs out his dog-eared copy of the specifications and reads that under item "Seal Coats" it provides for use of SC-6, 200-300, MC-4 or 5, RC-4 or 5, and RS-1 at discretion of engineer at rate of .15 to .25 gal. per sq. yd. and 20 to 25 lb. of % in. No. 6 rock. So he averages oil at .2 and rock at 22 1/2 lb. and does some scribbling on the back of an envelope.

Johnny: "Guess you'll need about 3 more 10's."

Izzy: "Okay, I'll go into town this morning and get it rolling."

Johnny: "Okay."

Izzy: "I guess we got about 2000 tons screenings stockpiled. We robbed 'em for that detour, 2000 enough?"

Johnny does some more scribbling at 22 1/2 lb. per sq. yd. and says:

"Yeah, guess that will do it."

Izzy: "They may be a little damp from that storm three weeks ago. Think they'll be okay?"

Presented at the Second Nevada Asphalt Forum, Carson City, Nevada, November 18, 1948.

is covered lightly with hot asphalt put on with a sprinkling pot. The hot asphaltic mix is dumped from the haul truck onto the road as needed, spread by shovellers and raked by hand to secure a smooth patch with feather edges.

After being rolled and allowed to cool a little, the patch is sealed with hot asphalt spread from a flush cart. This flush cart is equipped with a rubber belt and valve so that the amount of asphalt can be controlled by the operator as he pulls the cart along, and the belt spreads the material evenly and without excess.

In order to secure good cover, pavement is lightly sprinkled with water just before it is sealed. This water is changed to steam when the hot asphalt is spread and this causes the asphalt to foam and coat the surface completely. The rubber belt is 6"x3"x3" long. A good operator can make a nice smooth seal with this. The cart should be operated longitudinally with the road, lapping each spread slightly.

On the sealed surface a light spread of screenings or sand is made and traffic is permitted over the patch.

For the last 20 years we have followed the practice of repairing all our pavements with portable paving plants operated by state crews. We have a number of good contractors in this state who perform asphaltic paving and we know of one county which contracts its pavement patching and has secured good results; however, we believe this type of maintenance is better performed by state forces than by contract, as the work is variable and would require much inspection if done by contract.

The State has done a small amount of pavement patching in some of the cities where no paving contractor is available and where the amount of work is too small to interest a contractor. In several cases, we have purchased hot asphalt mix from paving contractors. The mixes are so designed that even after sealing they will have a sandpaper finish to prevent skidding.

We believe these portable plants and this method of patching promptly have preserved the original pavement and provided a safe, smooth surface for traffic.

R. H. Baldock is state highway engineer of Oregon.

Johnny: "Yeah, guess so. They'll dry out on the road. Don't forget specifications say no oiling until temperature is 50 F."

Izzy: "Yeah, I know. Think we'll get it?"

Johnny: "Yeah, I guess so—by 10 o'clock anyway."

Izzy: "Will that old distributor we used on the detours be okay? The new one is down on the Las Vegas job."

Johnny: "Yeah, I guess so. The old crate looks like hell but she seems to spread pretty good."

Izzy: "Anything else?"

Johnny: "No, I guess not."

Izzy: "Okay, then, guess I'll get rollin' and order the oil. So long."

Johnny: "So long. See you Monday."

Gentlemen: That seal coat job was "engineered" by 13 guesses, and 13 is an unlucky number. Exaggerated? Of course, but, unfortunately, in far too many cases, not very much. Of course, this conversation and location are purely fictional and could never have happened in Nevada, but we happen to be here, so let's proceed.

Well, what happened to that seal coat job later? You can well guess. Screenings whipping off, bleeding in June, corrugating in July. Maintenance Department frantic in August, etc.

What should have been done?

Why and When to Seal

Why

In the first place, never put on a seal coat until you are sure you need it.

You are only sure you need it if it is necessary to accomplish one or more of the following:

1. To seal moisture and air from entering the pavement.
2. To non-skid the surface if slippery.
3. To rejuvenate or enliven a dry or weathered surface to improve wear resistance.
4. To improve luminosity or night visibility.
5. To reinforce and build up pavement structure.
6. Traffic lane demarkation (rumble).

The type of seal I am talking about is one application each of asphalt and fine aggregate. Armor coats, surface mulches, etc., are in a separate category and topics unto themselves.

When to Seal

1. In good weather. One government agency in a survey of seal coats classified as "excellent" found that between 85% and 90% were done in June and July. Of those classed as failures, 60% were done after October 1st. In other words, you have less than a 50-50 chance of getting a

good job on work done in late fall. Can you as engineers afford to "buck" such odds? I think not.

2. Seal at the first sign of distress or need for any of the factors listed above.

When NOT to seal:

1. To cover up sins of omission and commission which should not be permitted in the first place.
2. To try to correct corrugations or cracking due to base failures.
3. To try to correct pushing or shoving due to unstable mixtures. A seal will not cure these things.
4. Do not seal unless you are sure

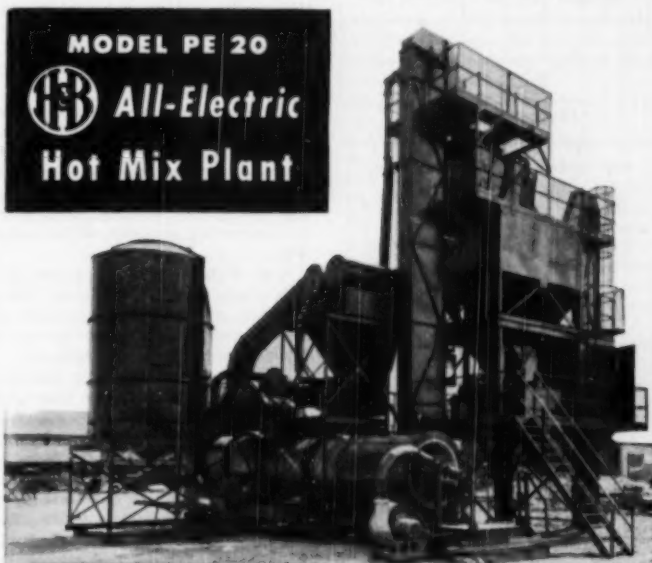
it is needed.

How to Proceed

After you are sure you need to seal, how to proceed and what to think about, will now be considered.

While the asphalt content of a pre-mix pavement is usually very carefully determined in terms of aggregate voids, surface area, stability, and the like, it has been all too common practice to decide on the quantity of asphalt for sealing, or surface treatment, by eye, or rule of thumb—or by guessing. The asphalt requirement for surface sealing with a given ag-

(Continued on page 92)



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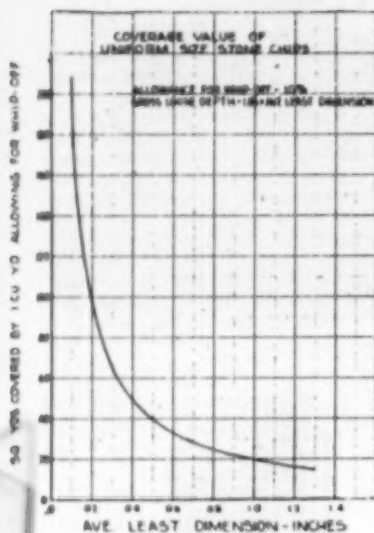
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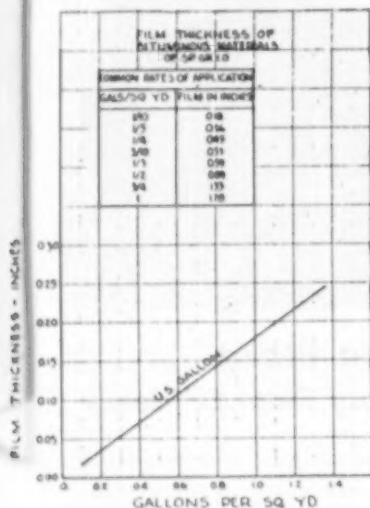
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★ Fig. 1—Relationship between average least dimension and coverage value with allowance for whip-off



★ Fig. 2—Relationship Between Film Thickness and Gallons per Square Yard

gregate should be as carefully proportioned as in the case of any other type of bituminous surfacing.

The amount of asphalt required in a surface treatment course bears a definite relationship to the percentage of voids in the layer of covering aggregate, but no attempt should be made to provide sufficient binder to fill all the void space. The one great advantage which surface sealing has over nearly all other types of bituminous paving is that with surface seal-

ing, although sufficient binder to fill only 50% to 70% of the voids between the stones is applied, nevertheless, the road will be thoroughly sealed and waterproofed, while the rock particles are held securely in position. If the asphalt fills half the voids, or in other words, rises to half the height of the layer of stone, then a strong waterproof mat of rock and asphalt will cover the roadbed and at the same time the top half of the stone will present a mosaic non-skid surface.

The New Zealand Approach

Now, how to arrive at that correct relationship. Various agencies have studied the problem but none seems to have carried it to a satisfactory conclusion any better than did F. M. H. Hanson of New Zealand some 12 or 15 years ago.

Hanson, correctly observing that the right amount of asphalt to fill a portion of the voids, depended on the characteristics of the cover stone, has given us, through his research and studies, two means of employing an engineering approach to the problem.

One of these is more or less approximate, but much better than guessing, and consists of calculating the compacted depth of stone as a percentage of the loose depth.

Hanson found that with average conditions, which include size and grading of aggregate normally used, the voids in a loose layer of screenings on the road can be taken as 50% of the average depth of the aggregate. The average thickness of a loose layer of cover stone is found by dividing the volume of the screenings by the area of the road covered. This, of course, assumes a nominal spread to completely cover the surface with an allowance of not to exceed, say 15%, for whip-off. This loose depth is reduced when the screenings are compacted under rolling and is still further reduced under the compaction of traffic. The first reduction in volume (or depth) occurs in a short space of time, and is comparatively great, whereas the compaction which takes place under traffic is relatively small and occurs over a long period of time.

For practical purposes, the voids in the roller compacted cover coat aggregate may be taken as 30%, while in time there are about 20% voids in the traffic compacted aggregate. So, for example, if the average depth of a layer of cover coat aggregate after the final compaction is $\frac{1}{2}$ in., then voids may be considered as a depth of $\frac{1}{10}$ in. (20 per cent of $\frac{1}{2}$ in.) and if a film of asphalt of this thickness is applied to the road, the asphalt will ultimately rise to just the aver-

age height of the chips. Experience has shown that the stone will certainly be held in position if the asphalt is not less than 50% nor more than 70% by volume of the void space.

Further, the ultimate compacted depth of a layer of loose screenings equals about 62½% of the average net loose depth, which is the volume of stone less the allowance for traffic whip-off divided by the area covered.

Hanson, finding that the above method of calculating the compacted depth as a percentage of the loose depth was not altogether satisfactory, devised a more accurate method.

Flat Chips Measured

The coverage value of the aggregate for the area which will be covered by one cubic yard when spread one stone thick and with the chips shoulder to shoulder is not always known. Yet, there is a simple, definite and accurate method of determining the compacted depth of sealing coat aggregate. No stone chips are so regular in shape that each chip does not have one dimension less than every other dimension. It is the average of these least dimensions of the chips forming a cover coat aggregate which determines the average compacted depth.

A close examination of a sealed surface will reveal that all the chips are lying on their flats, so that their least dimensions are the height of the upper surfaces of the chips above the original surface.

This least dimension of a stone chip can be readily determined by caliper measurements. By measuring individual pieces of a representative sample of cover coat aggregate, the average least dimension is ascertained as well as the range of least dimensions occurring in the material. The average least dimension of sealing chips is a most important factor, as cubical chips may have the same screen analysis as very thin "flattish" chips, but the coverage value and especially the compacted depth will be quite different. The thin "flattish" chips might be spread at the same rate per square yard as the cubical chips, but in the case of the former there will be a much greater whip-off since the chips adhere only one stone thick. Screen analyses are an approximate guide when the general shape of the chip is known. It is usual to call for angular chips free from thin or elongated pieces, but just when is a chip thin? No matter to what loose depth chips are applied, provided they are not too small and "flattish," and provided they are spread shoulder to shoulder, the compacted depth will remain constant. In other words,

heavier applications of chips mean only a higher percentage whipped off under traffic.

The compacted depth or average least dimension is 62½% of the net loose depth, and therefore the average least dimension of any chips multiplied by 1.6 will give the minimum loose depth of those chips from which the minimum volume may be calculated. Unless chips are of a very uniform size, it is not practical to spread so there will be no whip-off. In practice, an allowance of about 10% to 15% for whip-off and perhaps some small wastage in handling should be made. To cover such losses the average least dimension should be multiplied by at least 1.85. This gives the gross loose depth from which the volume required for any area can be obtained. Fig. 1 shows the relationship between the average least dimension and the coverage value with an allowance for whip-off.

The importance of the average least dimension of the aggregate for surface sealing will now be apparent. It enables the coverage value of chips for average spreading to be calculated. It gives the compacted depth of the chips as sealing cover coat, and since the compacted layer of aggregate contains 20% of voids, the amount of bituminous material necessary to rise to any height around the stone can be readily determined.

In calculating the quantity of bituminous material for surface sealing it is necessary to convert the depth of film required into gallons per square yard or vice versa. A graph and table for this purpose is given in Fig. 2. *The quantity of bitumen should not exceed 70% of the void space in the compacted cover coat aggregate.*

In determining average least dimensions of fragments in a sample of cover coat aggregate, it will be found there will be a range between the lower and upper limit in least dimensions which it is desirable to keep below ½ in. Vibration of vehicles will begin to be apparent if the least dimensions of the individual chips of a cover coat aggregate vary by ¼ in., and the vibration becomes uncomfortable when the variation exceeds 1 in. This is especially true for lighter type vehicles. This feature can be deliberately created for traffic channeling—particularly as a warning on shoulders under night driving.

Asphalt Requirement

We have been considering only the amount of asphalt required to seal a uniform, smooth, non-absorptive, unyielding surface, from the standpoint of the correct amount under these conditions to fill from 50% to 70% of the voids in the aggregate cover

Table I—Cover Materials Suitable for Use with Different Asphalts

| Seal Coats and Surface Treatments | Liquid Asphalts | | | | | | | | | | Paving Asphalts | |
|-----------------------------------|-----------------|---|---|---|---|----|---|---|----|---|-----------------|------|
| | C | | | | | MC | | | SC | | Emulsions | |
| | 1 | 2 | 3 | 4 | 5 | 2 | 3 | 4 | 5 | 6 | RS-1 | RS-2 |
| Coarse sand cover | x | x | | | | x | x | | | | x | |
| Clean ½ in. aggregate cover | x | x | x | | | x | x | | x | x | x | x |
| Clean ¾ in. aggregate cover | x | x | x | x | | x | x | | x | x | x | x |
| Clean 1 in. aggregate cover | x | x | x | x | x | x | x | | x | x | x | x |
| Graded gravel aggregate cover | | | | | | x | x | | x | x | | |

(Note: Choice in size of screenings will depend somewhat upon the objective but for general usage there seems to be a trend, in California at least, to a compromise between ½ in.-No. 8 and ¾ in.-No. 10 by specifying a medium fine screening ¾ in.-No. 8. The ½ in. (fine) are troublesome to produce and have a tendency to pad and develop ripples quite readily, whereas the ¾ in. (medium) may be a little on the coarse side for general usage. The objective to accomplish, together with the characteristics of local deposits and cost of production will be the determining factors in the final choice of maximum size and gradation.)

coat. There are, however, three and possibly four variables which must be considered. These are:

1. The amount of asphalt to seal the surface and provide from 50% to 70% to fill the voids as discussed above.
2. The amount of asphalt required to prime the existing road surface if dry and absorptive and bring it to a uniform condition. This requires additional asphalt over and above that noted in item 1 above.
3. The porosity or absorptive qualities of the cover aggregate itself.
4. To a much lesser extent, the roughness and surface texture of both the existing surface and the individual particles of cover stone.

There must also be considered that type of soft or yielding surface wherein embedding of the cover aggregate can be expected in a relatively short time under traffic. This is most likely to occur on extremely fine graded mixes, or "fat" surfaces. I know of no substitute for experience when sealing such a surface. The above theories of relationship of asphalt to void space do not work on such over-rich old surfaces because the voids in the cover stone are ultimately filled with a portion of the old road surface. One can only say that under these conditions, the asphaltic seal should be applied very sparingly indeed as it functions more or less as does the glue in a mortise and tenon joint in woodwork, than as a seal coat in the accepted sense.

The amount of oil required to prime the old dry surface must also be arrived at somewhat experimentally; or, if too badly weathered, perhaps the seal should be split into two shots with a different type of oil on the first application, to bring the old surface to a uniform condition. In any event, the amount of residual asphalt over and above that required to prime must be left on the surface to hold the screenings, as outlined above.

An idea of the absorptive quality

of cover aggregate and hence additional oil required may be determined by such a method as advocated by Hveem in testing the coarse fraction in the C.K.E. test; that is, the retention of S.A.E. No. 10 Motor Oil when the screenings are soaked therein.

The item of roughness of surface texture of the old road surface, unless extreme, can probably be ignored in most instances as the bracket, or tolerance, of 50% to 70% is usually sufficient to care for this variable. If not, this additional demand must also be determined.

Type of Asphalt

There is a relationship between the size of aggregate one can expect to hold and the viscosity of the asphaltic binder. This relationship is shown in Table I.

Good seal coats have been laid with all of these combinations. However, let us suppose that henceforth and forever, we were to be told that one and only one asphaltic product (as they now exist) was to be available for seal coat work. Which one would we choose?

First, let us analyze the desirable properties:

1. It should be reasonably practical and economical; that is, it should be a product which can be produced by normal refinery operations and not some expensive, hand-tailored drug-store concoction.
2. It should be as fool-proof as possible; that is, easy to handle and apply and dependent upon the vagaries of nature and the human element to the least possible extent.
3. It must develop sufficient viscosity quickly to hold the screenings; that is, it must cure or dry quite fast so that the least amount of inconvenience to traffic will ensue, and also the least amount of injury or loss of screenings will occur under traffic during the seal's early life.
4. It should preferably be a product on which a viscosity of from 75 to 150 sec. S.F. can be obtained at the spray nozzle, without excessive heating.
5. It should have some "flow" characteristics immediately upon application to the surface but not for over a few seconds; that is, some "flattening out" is desirable to ameliorate unequal distribution, but, on the other hand, this feature must not be so pro-

nounced as to permit the binder to continue to flow on transverse or longitudinal grades.

6. The residual asphaltic seal, after curing or drying, must not become excessively brittle at low temperatures nor, on the other hand, should it ever acquire a lower viscosity than about 1500 sec. S.F. at the highest road temperature which can be expected.

7. It should penetrate or grasp the old surface sufficiently to secure a good bond and seal surface voids and/or cracks, but not be so thin as to continue to penetrate or "migrate" after curing.

8. The residual asphalt content must be high enough so that for the needed residual deposition on the road, no excessive application entailing temporary submersion of cover aggregate is required.

9. It should preferably be able to "kill" a small amount of dust and still bond either to the old surface or the cover aggregate.

To return now to the question of choice of one and only one product to meet the most of these various demands under all conditions for seal coat work only, what type of asphaltic product is indicated? And here, no doubt, the argument will start. To get in my "two-bits" worth before be-

coming submerged, I'm going to pick RC-4.

Fortunately for you, the user, the choice need not be so restrictive. However, your choice, whatever is indicated, should be arrived at by a similar line of reasoning adapted to your particular case.

Accomplishment of Seal Coat

After the basic ingredients and their relative proportions have been decided upon, the next step is how to proceed to accomplish the desired results.

There are three basic steps in the accomplishment of any type of seal coat work. They are:

1. Cleaning the existing road surface
2. Uniformly applying the asphaltic binder
3. Uniformly applying and consolidating the cover aggregate.

Easy to say, but not so easy to do.

The first step is obvious but often slighted. Very little dust, dirt, mud or other foreign matter can be tolerated, either on the surface to be sealed or on the individual particles of aggregate. Cleanliness at this point is probably not even second to godliness. In any event, the surface must be scraped, broomed, flushed, either mechanically or manually, as necessary to secure the desired result.

You are all familiar with this tedious chore and perhaps the least said the better.

The second step, however, of uniformly applying the asphaltic binder cannot be skipped over so lightly. It is not enough to say the bituminous seal material shall be applied by pressure spraying at the predetermined rate and at the specified temperature range. This must be further amplified by certain other "musts":

a. The nozzles must be set at the proper height and kept there.

b. All nozzles must be kept clean and working properly.

c. Valve action both on and off must be instantaneous.

d. Proper lapping and not overlapping of joints must be carefully watched.

e. Proper temperature must be consistently maintained at the spray bar level.

f. All areas unavoidably missed must be immediately hand-sprayed at the specified rate.

g. The exact coordination of pressure, capacity, and speed to produce the specified rate of application must be consistently maintained.

There are certain aids to securing the desired results which are within the power of the engineer such as the use of building paper at transverse joints, setting guide markers for

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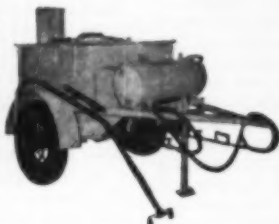
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equipment drivers, setting guide markers for limits of the load, insistence upon maintenance of straight driving, etc., but, I am sorry to say, that in most instances the engineer is almost wholly at the mercy of the particular distributor being used and its operators. This is not good but there seems little we can do about it until the perfect distributor is built.

As engineers, we can do a few things, however, such as specifying certain features of the distributor including a full circulating spray bar, accessible pressure and temperature gauges, tachometers, and uniformity of application for both the spray bar as a whole and also each individual nozzle. In regard to the latter, much can and should be done. In the U. S. the best type of nozzle to my knowledge is the conical type. They should be mounted staggered with 50 per cent overlap on a dual type spray bar. I understand that Argentina has perfected a slot type in which the slot is oval shaped and carefully machined for uniformity of spray. There may be others, but we all know the ordinary slot type used so frequently in this country leaves much to be desired.

You may think the application of asphalt is uniform, but are you sure? For example on one test job of which I am aware and on which all participants knew it was a test and were doing their best, the spread, measured at various intervals throughout the output of the distributor load, varied from .13 to .19 gal. per sq. yd. when .17 was desired. This, mind you, under especially carefully controlled conditions. On the same test, the spread of screenings varied from 17 to 45 lb. per sq. yd. when 22 lb. were desired. Unusual? Not at all, in my opinion. In fact, probably much more accurate than the usual results. Try, sometime, putting a one square yard piece of some thin material at the quarter points in the line of spread, weighing it before and after application, and you will see what is meant. I'll wager you'll be disagreeably surprised.

Also, try testing the full length of spray bar. This may be done in different ways, such as with the use of paper cut into longitudinal strips and comparing the difference in deposition on the various strips. A variance of more than 10 per cent should be enough to condemn the distributor. In various foreign countries a compartmented box has been used successfully similarly to test uniformity. The point is, lateral uniformity should not be taken for granted, neither should uniformity of individual nozzles.

The third step consisting of proper-

ly applying and consolidating the cover aggregate, as you all know, can "make" or "break" any seal coat job. By skipping over this phase of the work rather lightly, I do not mean to minimize its importance. However, in the interests of brevity, only a few pertinent features will be emphasized.

a. Mineral aggregate should be applied as soon as possible on the freshly applied bituminous material, regardless of type.

b. The screenings should be sound, uniformly graded from coarse to fine, and free from thin or elongated pieces.

c. Apply screenings by backing the truck and chip spreader. The use of

modern spreaders for accuracy and uniformity of application, is strongly recommended.

d. If item c is properly done, very little broom dragging should be necessary. In any event, disturb the original deposition as little as possible but, of course, uniform and complete coverage is necessary.

e. Roll as soon as complete coverage is secured the same day in which the screenings were applied. Steel-wheeled rollers may be used if the surface is smooth enough but generally a pneumatic-tired roller will do the best job. Avoid over-rolling, particularly with steel-rollers.



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f. Do not be in too much of a hurry to open to traffic, if possible to wait. In any event, give the bituminous binder a chance to "set-up" by controlling abusive traffic during the seal's early life.

Miscellaneous Considerations

1. Quantity of cover stone should be corrected for specific gravity if specified by weight. After all, the functional relationship is one of volume.

2. Residual deposition of asphalt must be taken into consideration if the

solids content of the asphaltic binder used is less than approximately 80 per cent.

3. Rate of curing versus intensity of traffic must be considered and the surface protected during its early life with controls if necessary. In other words, the time element must be considered.

4. Temperature-volume correction as it affects resultant volume of the asphalt at road temperature, must be applied.

Summary

To summarize the things which must be considered in the construction of a good single shot seal coat, ask yourself these questions:

1. Am I sure the surface needs an application of asphalt and screenings?
2. If so, what do I expect to accomplish:

- a. To shut out air and water?
 - b. To non-skid?
 - c. To rejuvenate or enliven?
 - d. For improved luminosity?
 - e. For reinforcement of pavement structure?
 - f. For traffic lane demarkation?
3. Am I reasonably sure of success at this time of year?

4. Am I trying to make a seal coat do a job it is not suited for—to correct base failures, unstable mix, etc.?

5. Have I determined the proper residual asphalt film thickness with relation to aggregate voids?

6. In arriving at the film thickness, have I considered:

- a. Absorption of existing road surface?
- b. Porosity and absorption of aggregate?
- c. Surface and aggregate roughness?

7. Will traffic embed the cover stone in the existing surface?

8. Have I picked the best type of asphaltic medium for the conditions I have to meet?

9. Is the surface clean as it is practical to get it?

10. Have I checked the distributor and nozzles for uniformity of application?

11. Likewise, the screening spreader?

In the foregoing, I have not, perhaps, covered fully every detail and ramification in seal coat work, but have attempted to point out various important features often overlooked or slighted. I have also attempted to point out certain considerations, remedial measures, and procedures which I hope will stimulate your thinking and, if followed, may result in better seal

coats. In other words, if, through this harangue, you have been aroused to the necessity of "engineering" seal coats instead of "guessing" them, the objective of this paper will have been accomplished.

Plan Hot Plant Paving

A higher grade of pavement to accommodate the heavier vehicles is being planned for all future construction of New Mexico highways on heavily traveled roads.

This type of construction, it is estimated, will cost approximately \$3500 more a mile to build than cold road mix type heretofore used, and will consist of a 1½-in. hot plant mix on top of an asphalt processed base. A base course of sufficient thickness, as indicated by a study of the soils profile prepared by the department's testing laboratory, will be placed under the riding surface.

Commenting on this change, a New Mexico road official said, "We feel that the additional cost will lengthen the years of service and accommodate the heavy truck traffic that now plies the highways. New Mexico highways were not designed to carry the loads that are asked of them by the trucking interests and the resulting deterioration has made many roads unsafe long before their time.

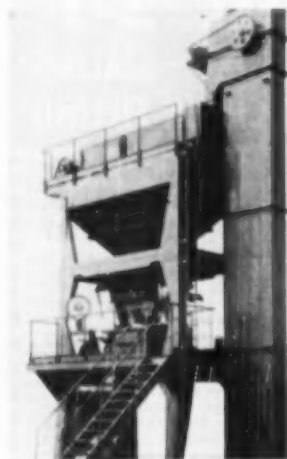
"The nonavailability of construction machinery has delayed putting such a program into effect, but now that the proper type of machinery can be obtained by the contractors all future construction on heavily traveled roads will be paved with the higher type pavement."

This Contractor Holds Safety Drawing

The W. L. Johnson Construction Company, recently at work on the relocation of Route 66 and the Cloverleaf for Routes 22 and 66 in Westmoreland County, Ill., employs an excellent idea for maintaining interest in its safety program.

Each week a "Safety Drawing" is conducted for each man represented by a certain number which is dropped into a box. The numbers are then drawn by one of the employees and the awards passed out to the men on the job. The total amount awarded each week is \$50—one \$10 bill and the rest \$5 bills. However, for each lost time accident the \$50 is reduced by \$25, and for each case requiring medical treatment \$5 is withdrawn from the total sum.

(From "Construction Safety" bulletin of the National Safety Council)



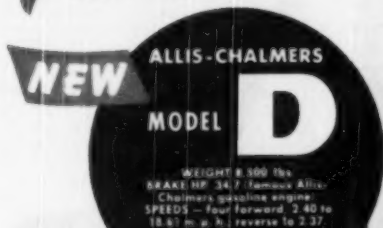
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Yet has many big grader features — Tandem Drive, "Roll-Away" Moldboard, Tubular Frame, Hydraulic Blade Lift, Engine Over Drive Wheels, Drop Down Transmission, High Throat Clearance, Complete Operator Comfort, Full Visibility, Simplified Servicing.

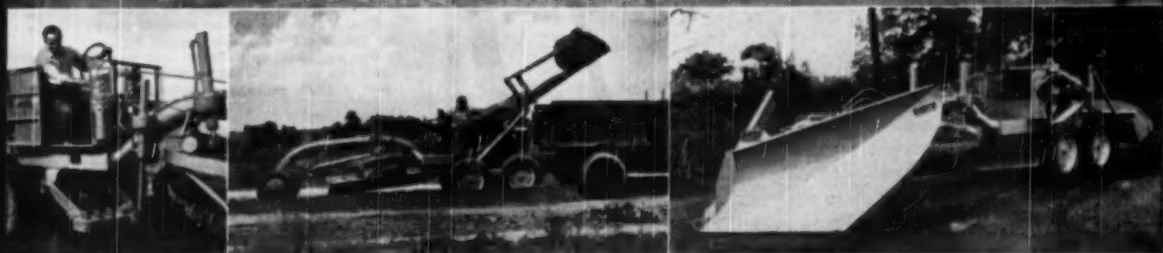
Plus special attachments that widen its usefulness — Rear-End Loader, Scarifier, V-Type Snowplow with interchangeable blade for backfilling and light 'dozer work. Also various other accessories, including All-View Cab that is lifted off or replaced in a jiffy.

Ask your Allis-Chalmers dealer for a demonstration.

ENGINEERED FROM THE GROUND UP... to bring you **BIG** grader design and performance advantages.



MAINTAINS DIRT AND GRAVEL ROADS AND STREETS
CUTS TOE FROM ENCLOSURES, HANDLES LIGHT
CONSTRUCTION — BURNS AND CLEANS DITCHES —
SLOPES BANKS — UP TO 3:1 — LEVELS SUB-GRAD, IDEAL FOR FINISHING



HYDRAULIC SCARIFIER — does a surprising job
...rear-end weight keeps teeth ripping uniformly,
at desired depth—smooth, positive steering.

LOADS MATERIAL into trucks with
Tractomotive Loader — from windrows
and stockpiles...surplus dirt or snow.

PLOWS SNOW with specially de-
signed Baker snowplow (backfills
with interchangeable blade).

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Land Acquisition Practices in Kansas

The method used in the acquisition of land for highway purposes in the State of Kansas is unusual in that practically all right-of-way is acquired by condemnation, in one action, covering everything needed on a project, including right-of-way, borrow pits, stream changes, detour and backslope easements. The purchase method is used when the State considers it expedient to do so, but this is usually when only a few landowners are affected or when it is necessary to obtain a single tract for maintenance, a shop site, or a material storage site.

The right-of-way department's activities in connection with a proposed construction project begin when complete construction plans, showing the desired right-of-way lines, borrow pits, easements, etc., are received from the design department. The right-of-way department then prepares a motion to be acted upon by the State Highway Commission, authorizing acquisition of right-of-way for the project. When this has been done and certificates of title obtained from an abstractor in the county in which the project is located, the project is assigned to a right-of-way agent.—*Highway Research Correlation Service, Circular No. 67.*

1949 Major Equipment Developments

(Continued from page 74)

pendent travel unit provides one or two speeds forward and reverse (as the customer requires). The Model 727 includes special features for levee and other dragline work as well as clamshell and crane service.

11

Crane: Hanson

A new mobile crane, Model MC-41, with 6½ tons rated capacity introduced by Hanson Clutch & Machinery Co., Tiffin, O. is similar in most specifications to the crawler mounted Model 41, a standard unit in the Hanson line. The new crane



can be equipped with all the attachments—shovel (1½-yd.), trench-hoe, clamshell or dragline. Mounted on rubber, it features four-wheel air brakes, air steering and optional two or four wheel drive. All operations are controlled from inside the operator's cab.

12

Diesel Locomotive Crane: American Hoist

A new 10-ton diesel locomotive crane announced by American Hoist & Derrick Co., St. Paul 1, Minn., is stated to be engineered especially for high speed work and for use on lighter jobs where the use of a larger crane would be less economical. Powered by an electric-starting diesel engine developing 72 h.p. at 1600 r.p.m., the new Model 410 has a rated capacity of 20,000 lb. with a 40-ft. boom at 12-ft. radius.



"CATERPILLAR"
PUTS POWER
WHERE IT
PAYS OFF

Win
VELVETOUCH
ALL-METAL CLUTCH FACINGS

You cut power losses... get dependable starts and stops... when your tractors and earthmovers are Velvetouch equipped. Because Velvetouch clutch facings and brake linings are built tough... to give you peak performance on every job. You'll find they last longer, too... for Velvetouch products are all-metal... to insure maximum service life.

FOR BRAKE AND CLUTCH USE
VELVETOUCH
THE S. K. WILLMAN CO.
1224 East 4th St. • Cleveland 3, Ohio

Velvetouch clutch discs for saving clutch, foot and rear power control with clutch.

WORLD'S LARGEST MANUFACTURERS OF ALL-METAL CLUTCH FACINGS AND BRAKE LININGS

13

1/2-Yd. Shovel-Crane: Link-Belt

An addition to the shovel-crane line of Link-Belt Speeder Corporation, Cedar Rapids, Ia., was Model LS-51, a 1/2-yd. shovel-crane, equipped with Speed-o-Matic full hydraulic controls. First introduced in 1936, Speed-o-Matic controls until now have been available only on machines of 1 1/2 to 3 yd. capacity. The LS-51 is fully convertible for operation as a shovel, trench hoe, lifting crane, dragline, clamshell or pile driver. Changing from one attachment to another is quickly accomplished with only slight changes in the machinery. The front drum lagging used in dragline and other cable operations is interchangeable with a split sprocket used in connection with the independent positive chain crowd on shovel operations.

14

Truck-Mounted Crane: Wayne

A new 1/2 yd., 10-ton truck-mounted crane and excavator was announced by the Wayne Crane Division of American Steel Dredge Co., Fort Wayne 1, Ind. Known as the Model 44 Corsair, the machine travels at truck speeds, swings at 5 1/2 r.p.m., and is convertible to all crane and shovel attachments. The 6-wheel, tandem-type carrier, built especially for crane mounting, is of 16 in., 45 lb., steel I-beam construction. Outrigger tubes are integral with frame—one pair ahead of front wheels and one pair behind rear wheels—to provide maximum rigidity

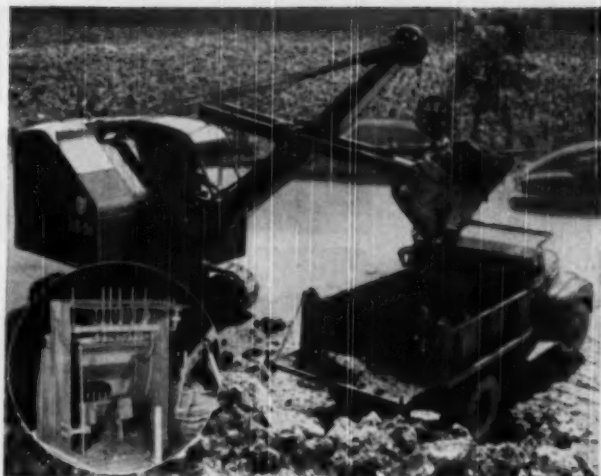
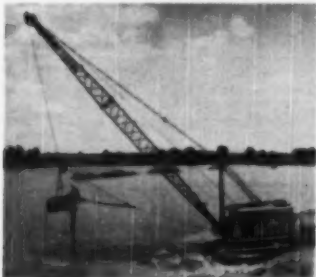


and stability. An auxiliary transmission provides ten speeds forward and two reverse. Power is supplied by a 6-cylinder gasoline engine which develops 105 hp at 3200 r.p.m. The crane is powered by an 8-cylinder gasoline engine which develops 62 hp at 1800 r.p.m.

15

2-yd. Excavator: Bucyrus-Erie

A new 2-yd. power shovel, the 51-B, was announced by Bucyrus-Erie Co.,

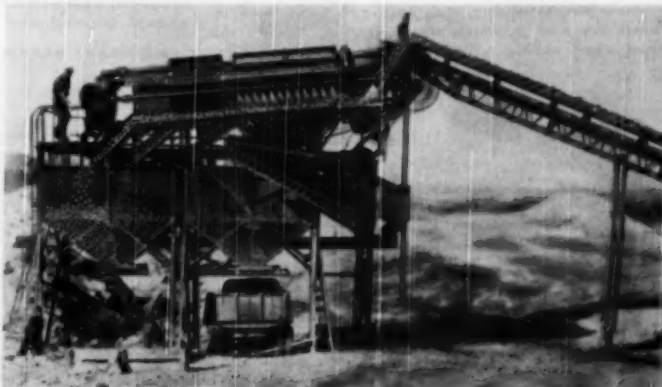


South Milwaukee, Wis. The 51-B is convertible in the field for crane, dragline, clamshell or shovel service. The single unit inside dipper handle of the new 51-B is similar to other of the company's machines including their 36 yd. 1050-B stripping shovel. The twin rope crowd is fully independent of hoist. Full engine power may be applied to the crowd if necessary. Direct mechanical control of crowd, hoist and swing gives an exceptionally fast digging cycle. For dragline and clamshell service, booms from 50 to 90 ft. in length are available. Crane booms may be purchased up to 110 ft. in length.

16

25-Ton Crane: Bay City

A 25-ton capacity rubber tire mounted crane was added to the line of Bay City Shovels, Inc., Bay City, Mich. With two types of carriers the crane is available as Model 190-T61 CraneMobile and Model 190 CW CraneWagon. The first mentioned is mounted on a specially designed, three axle crane carrier, powered by a separate heavy-duty 779 cu. in. displacement, automotive type gasoline engine, and equipped with 10 12.00x20 tires and Timken tandem rear axle unit with through worm drive. Main and auxiliary transmission provides 12 forward speeds up to 35 m.p.h., and three reverse speeds. The 190 CW CraneWagon is a self-propelled one-engine crane, mounted on a 6-wheel carrier equipped with 12 12.00x20 tires.



Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Aggregate Production

17

Aggregate Washing Plant: Pioneer

The illustration shows the flow of material through the completely redesigned 305-W aggregate washing plant of Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. The plant produces three sizes of rock and two of sand and has a capacity of 50 to 75 yd. per hour. It uses only 300 to 500 gal. of water per hour, and requires only 35 H.P. for operation. The plant is semi-portable and is simply designed from standard units and includes all framework, spouts and chutes. It is equipped with a mechanical feeder. The plant requires only one man operation.

(Continued on page 103)

New! ADAMS Traveloader



Self-propelled, self-feed, belt-type loader
for highway officials and contractors . . .

The New Adams Traveloader offers the fastest, most economical method yet devised for picking up and loading windrowed materials into trucks. Look at these important advantages you'll find in the Adams Traveloader:

- **CENTRALLY-LOCATED CONTROL STATION** . . . High—above the dust area—affords operator better vision in all directions, both working and traveling.
- **HIGH-SPEED REVOLVING FEEDER** . . . Delivers a continuous stream of dirt, sod, road-mix patch material, waste scarified material, snow, etc.—at a faster rate than other machines, for greater over-all production.

● **HEAVY-DUTY INDUSTRIAL-TYPE ENGINE** . . . Built for long, dependable, low-cost performance.

● **RUGGED CONSTRUCTION THROUGHOUT** . . . Designed for long life and quick, easy servicing.

Tested and proved under actual job conditions for more than two years, the Traveloader is a perfect companion machine for Adams Motor Graders. Before buying any loader, mail coupon for illustrated catalog—or see your local Adams dealer.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA



MAIL COUPON FOR DESCRIPTIVE LITERATURE

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119 South Belmont Avenue
Indianapolis, Indiana

Please send me illustrated, descriptive catalog
on the new Adams Traveloader.

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Official Connection.....

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Barber-Greene

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B-G COST-SAVING BULLETIN NO. 4907

4750 ASD-10-66

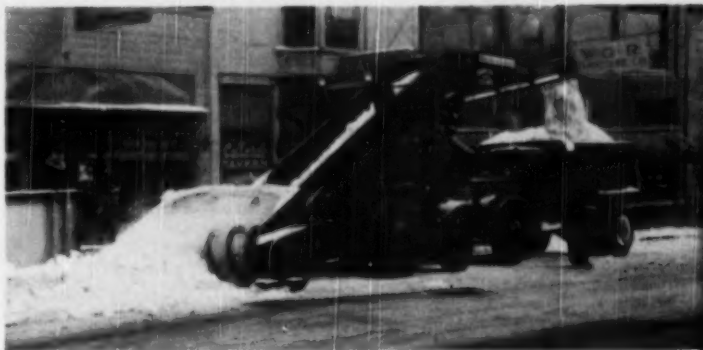
NEW SAVINGS IN LOADING, DITCHING, CONVEYING, AND PAVING WITH B-Gs

B-G Finisher Lays "Red Carpet" to Buckingham Palace

LONDON, England:—London's famed Mall, which features so prominently in the news whenever the King officially leaves or enters Buckingham Palace, is getting a new regal "red carpet" of red asphalt, placed by a B-G Tamping-Leveling Finisher. Under the direction of the Ministry of Works, the ancient wood block paving of the Mall was removed, and the sub-grade repaired. After a three-inch base course was placed, a one-inch wearing course of red granite, limestone dust and red (pigmented) asphalt was laid. Finally, red granite chips were spread as a seal coat.

The Limmer and Trinidad Lake Asphalt Company, contractors for the work on the Mall, has eighteen B-G Tamping-Leveling Finishers in operation—an example of how popular B-G Finishers are with contractors throughout the British Isles and the Continent. Their high speed performance, ability to place a smooth, level surface regardless of variations in the sub-grade are features that have established them as the leading road-surfacing method.

Green Bay's SNOW Loader Removes 562 Loads in 14 Hours

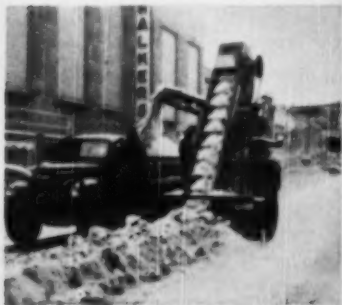
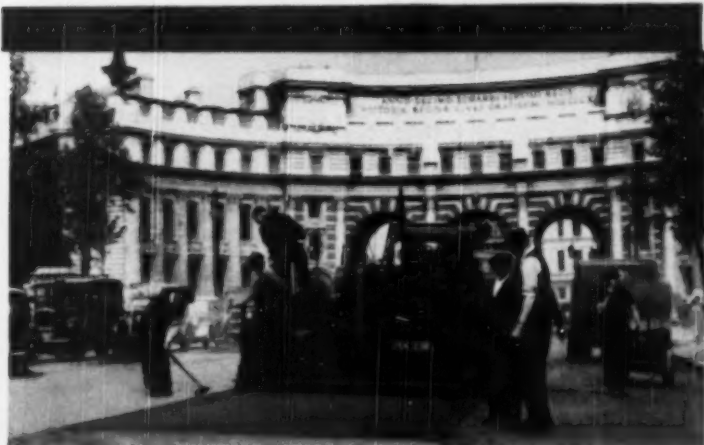


Green Bay, Wis.:—After one storm here, the city's B-G Snow Loader, working with twelve trucks, removed a total of 562 loads in a fourteen-hour period, loading a seven-yard truck in from 16 to 30 seconds. Such performance has meant a tremendous saving in costly truck time—especially when compared with manual methods or with machines not specifically designed for snow removal.

Green Bay, typical of so many other "snow-belt" cities, has found that the

B-G Snow Loader answers the problem of getting busy streets clear of snow with minimum traffic delay—and minimum cost. The Loader meets snow removal emergencies anywhere in the city in a matter of minutes—traveling under its own power at over seven miles per hour.

Wichita, Kan.:—This city's use of B-G 522 Snow Loader shows how a community can benefit from the two-way service it makes possible. In the summertime the 522 Loader loads trucks with sand, gravel or stone at a 1½ yard-per-minute rate. As winter approaches, by simply substituting an inexpensive and easily installed snow loader flight line, Wichita's 522 is equipped to load snow at as much as five yards per minute.



Digs, Screens and Loads Steel Mill Sand in One Operation



Leetonia, O.:—Single-pass performance of three important operations—digging, screening and truck loading—is standard procedure for two B-G Crawler Mounted Loaders operated at the Francis Brennan pit near here. Brennan, who supplies fine, screened, high clay content sand to the Youngstown steel mills, began ten years ago with a single machine and added the second Loader recently to bring the operation up to peak capacity.

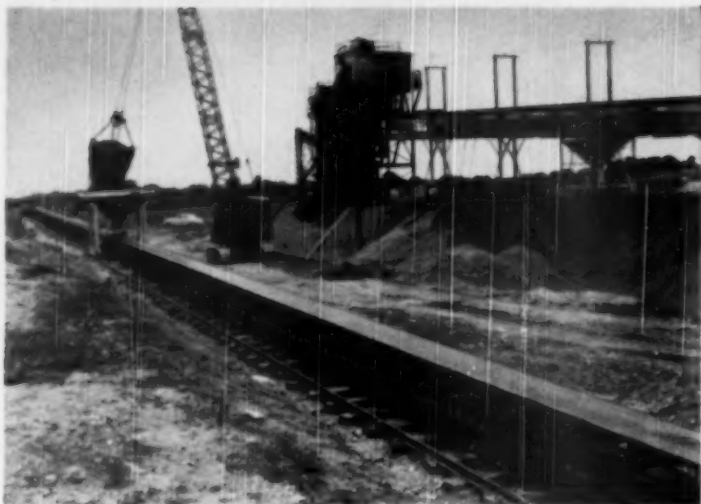
Operating each Loader is essentially a one-man job. Thus at extreme low cost, maximum volume of an exceptionally fine product is obtained here where everything over $\frac{3}{8}$ " is considered "oversize" and removed. Brennan's Crawler Mounted B-G Loaders are part of a complete B-G line which includes pneumatic-tired, self-propelled types for all bulk materials truck-loading services.

Soft Ground or Caliche . . . These B-G Ditchers Take It in Stride



Dallas, Tex.:—The performance of their B-G Runabout Ditcher has shown officials of a local gas company how to cut the cost of digging scattered service trench even under toughest conditions. The Runabout has proved that it will dig at an economical rate even through tough caliche and through soils containing rocks, boulders and abrasive sands. Much credit for this performance is given to the B-G Vertical Boom with "milling action" bucket line that literally "mills" its way into the soil.

The Runabout drives to scattered jobs at 15 miles an hour under its own power—digs close to obstructions, leaves no ramp to be dug out by hand.



Consumers Company speeds processing with barge-loading conveyors

Lacon, Ill.: One of the Midwest's largest aggregate producers, Consumers Company, solved its most recent large scale handling problem through the skillful use of an interesting plant-to-barge belt conveyor system. As a result, the company has stepped up its output to 250 tons per hour at its river gravel plant near here.

Consumer's dredge works in an inlet off the Illinois River, pumping up sand and gravel from an estimated 163 acre bed. The material is pumped directly to a tower screening and processing plant on the bank where the wet aggregate is sized and separated. Stone of uniform 1" size is discharged from the plant over a B-G Belt Conveyor at a height of some 70 feet.

Finer sizes are carried out of the plant in a long de-watering flume which forms a long stock pile adjacent to a 320' B-G Belt Conveyor. This Conveyor is loaded from a crane-fed movable hopper and discharges into a barge-loading Shuttle Conveyor. The 850-ton barges are quickly loaded on a highly economical basis.

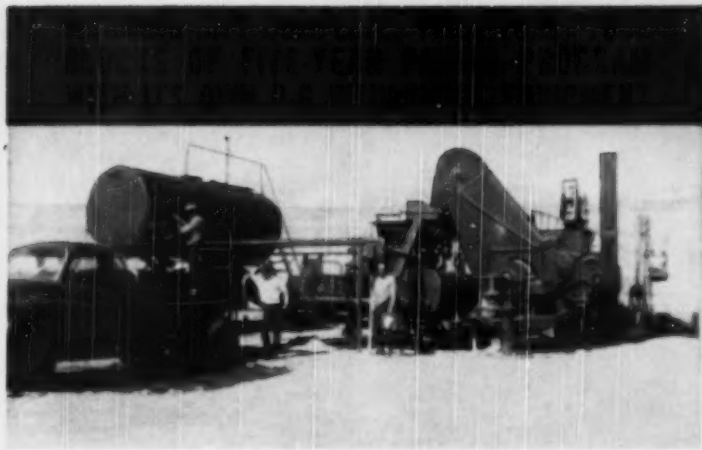
On simple conveyor set-ups such as this one, as well as on the most elaborate type of conveying jobs, B-G's "standardized" design, which permits easy assembly and equally easy disassembly for relocation, is a decided asset.



Aurora, Ill.:—All classes of digging confront the B-G 44C Ditchers operated by a midwest utility in furthering the company's expansion program. Not the least difficult is the job shown here—digging in tough, sticky soil. Here again the efficiency of the B-G Vertical Boom with "milling action" bucket line pays off. As the line flexes over the head sprocket, the heavy material is literally "kicked out," and the trench is dug at a steady pace. The bucket line is protected by the Barber-Greene Automatic Overload Release which trips automatically when a boulder or other hidden obstruction is encountered—and automatically resets itself when the obstruction is removed.

B-G Barge Loading Shuttle Conveyor loading 850-ton barge at Consumers Co. gravel plant.





Program Calls for Paving Every Street in Town . . .

Casper, Wyo.:—A record of paving 44 blocks of streets between June 8th and August 10th with their own B-G equipment—plus a five-year plan for paving every street in the city—is the example of a practical improvement program furnished by this community.

City officials, anxious to provide taxpayers with the best streets possible, were confronted with the problem of finding the contractor and equipment to handle the work. Since these were not available locally, the city decided to do its own paving work, selecting a B-G Maintenance Plant and Tamping-Leveling Finisher for the job. The B-G Plant is set up in a gravel pit owned by the city and charged by a front-loading shovel. The bituminous mix is trucked to the job site where the Finisher places a smooth, level surface regardless of variations in the sub-grade.

Quoting Mr. Leo Hallock, Councilman, the work done so far this year has "already paid for the plant and other necessary equipment."

"Rubber Road" Experiments Attract Attention of Road Builders, Safety Officials



Interested group of officials watching application of rubber surface by B-G Finisher 3 miles west of Richmond. Photo courtesy Virginia Department of Highways.



Experimental rubberized pavement laid on Ohio road by B-G Finisher. To be studied by State Highway Department officials for durability and non-skid qualities.

For years the idea of somehow incorporating the non-skid and durability features of rubber into road surfaces has challenged interested contractors, engineers, and safety officials. In recent months much progress has been made towards proving—or disproving—the practical usefulness of such an idea. All of the test roads reported have been laid with Barber-Greene Tamping-Leveling Finishers. Actually, while only a small quantity of rubber is used in the roadway (in the neighborhood of 7 lbs. to a ton of mix) it is felt that even this small amount will serve to skid-proof the surface sufficiently to permit stops on wet or dry pavement sooner than if the rubber were not included. In the Virginia tests, 500 ft. of rubber asphalt and 500 ft. of regular sand asphalt were laid end to end in a 1,000 ft. strip. In the Ohio test the 300 ft. test road is now being studied by the State Highway Department.

Versatile Unloader-Conveyor Team Solves Variety of Problems



Colchester, Ill.:—By-passing the need for using an expensive clamshell or shovel to load their mixer-charging hopper, McCann and Co., Inc. enlisted their low-cost, portable B-G Conveyor and Belt Car Unloader to do the chore at the site of their earth-filled dam job near here. It is practically a one-man operation: a bulldozer merely keeps the Unloader supplied with sand or stone and the machines do the rest. When not in use here, the Conveyor and Unloader are towed 5 miles to town to unload aggregate and cement from railroad cars—real every-day usefulness.

Oklahoma City, Okla.:—Building the city's South Side Disposal Plant called for filling 12 filter beds with high grade limestone to a depth of 6' to 7'—which meant unloading nearly 1800 car-loads of this costly, dust-free rock. Not long ago this would have required expensive unloading equipment, but the B-G "team"—Belt Car Unloader with Portable Conveyor—unloaded the cars so rapidly that they had to be kept operating at less than capacity to allow time for the stone to be placed in the beds. Time after time on the widest variety of unloading jobs, this team has set new standards for low cost, fast unloading of bulk materials.



Barber-Greene

NEWEST IN ASPHALT, MATERIAL HANDLING AND DITCHING EQUIPMENT



Here Are Suggestions
for Cutting Road Costs



BULLETIN 508

New Heavy-Duty Portable Conveyor

Latest addition to the long line of modern Barber-Greene Portable Belt Conveyors is the model 374, designed for a wide range of heavy duty loading, unloading and stockpiling services—for municipalities, contractors, industrial plants, mine and aggregate producers, etc. The 374 is available in a wide selection of lengths up to 60' and in belt widths of 18", 24" and 30". It further features swivel wheels, hydraulic hoist, antifriction carriers and a choice of gasoline or electric power. The 374 is entirely line-shaft driven to assure smooth, steady operation and low maintenance. Also available without the truck as a handy, semi-permanent unit.

"Suggestions for Cutting Road Costs" is the title of a new bulletin which should be of vital interest to all connected with road construction—contractors, engineers, state and county highway department officials, etc. Here is a new kind of literature—which gives valuable facts on stretching the road-building budget. Use the coupon to get your copy.

Use This Coupon to Get Full Information on B-G Equipment That Interests You

Make up your mind now to get full information on the Barber-Greene equipment which will help you save man-hours and money. Complete specifications and literature are available on all B-G equipment described in this bulletin. Use the convenient coupon below to indicate the equipment in which you are interested. Look this bulletin over again—and fill in and send the coupon today!

Barber-Greene Company, Aurora, Illinois, U.S.A.
Cable Address: Bargreene

Send information on the B-G equipment as indicated:

- ☐ Have Barber-Greene representative call.
- ☐ B-G Snow Loaders
- ☐ B-G Bucket Loaders of _____ Capacity
- ☐ B-G Permanent Conveyors
- ☐ B-G Bituminous Mixing Plants of _____ Capacity
- ☐ B-G Finishers
- ☐ B-G Portable Conveyors
- ☐ B-G Belt Car Unloader
- ☐ B-G Ditchers
- ☐ B-G Power Coal Loaders
- ☐ "Suggestions for Cutting Road Costs" Bulletin

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B-G Distributors Offer Wide Range of Valuable Services

Barber-Greene distributors stand ready to help in all phases involving the proper application of Barber-Greene equipment to your particular problem. In sales, service and engineering they have factory-trained experts who are well qualified to offer you valuable assistance.

Ask your Barber-Greene distributor for other cost-saving bulletins listed below:

- Bulletin 4901, Portable Conveyors
- Bulletin 4902, Bucket Loaders
- Bulletin 4903, Bituminous Equipment
- Bulletin 4904, Ditchers
- Bulletin 4905, Permanent Conveyors
- Bulletin 4906, The Complete B-G Line
- Bulletin 4908, Coal Handling Equipment

BARBER-GREENE COMPANY

Aurora, Illinois, U.S.A.

(Continued from page 97)

18 Gravel Crushing and Screening Plant: Pioneer

A completely new small gravel crushing and screening plant was added to the line of portable duplex plants manufactured by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. Designated as the 17-V, this plant incorporates all features of the larger "Bottom Deck Feed" plants. New features include a swivel type feeder conveyor, 12 ft. 6 in. overall height; all drives on plant proper are either V-belt



or tumbler shaft and gear box. Delivery conveyor folds at the side. Jaw crusher is 10 x 16 and the roll crusher 24 x 16. A 30 in. x 8 ft. 3 1/2 deck-vibrator screen provides 40 sq. ft. of effective screening area. The chassis is two axle with four 20:00 x 20 tires front and rear.

19 Portable Crushing Plant: Universal

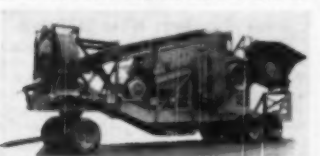
A low cost portable crushing plant, the Model TS16, added to the line of Universal Engineering Corporation, Cedar Rapids, Ia., is specifically designed for small jobs where specifications are not too rigid, and where more expensive plants are impractical. Gravel is delivered to the hopper over a mechanical feeder and then to the screen where the



over-size is removed and passed to the crusher. The fines passing through the screen are delivered by chute to the loading conveyor. As the over-size is crushed, it, too, goes to the delivery conveyor and is not returned to the screen for grading. The crusher is of a design that makes it possible to reduce the over-size to minus 1 in. if desired. The capacity of Model TS 16 Plant is 30 to 60 tons per hour, depending upon the amount of crushing required and the size to which the over-size must be crushed.

20 Crushing Plant: Universal

A new one-unit portable outfit, announced by Universal Engineering Corporation, Cedar Rapids, Ia., is a new ar-



range of three primary components—the Universal roller bearing jaw



HELTZEL

SUPERIOR CURB & GUTTER

Forms

Demand for Heltzel forms comes from experienced contractors who know Heltzel forms save time and money. **TIME**—because firmer installations can be made faster. **MONEY**—because Heltzel equipment lasts longer and involves less labor on the job. The example below of a flexible form is typical of Heltzel better built forms.

- CURB FORMS & ACCESSORIES
- COMBINED CURB & GUTTER
- SIDEWALK FORMS
- RIGID RADIUS FORMS
- FLEXIBLE FORMS
- SPECIAL FORMS



HELTZEL CURB and GUTTER SUPPORTS

The only flexible form with three alternate methods of support—(1) Full depth division plates, (2) Skeleton division plates, and (3) Overhead hangers. All Heltzel forms improve contractors' operations, because they speed up job while making the work easier.

PUT HELTZEL TO WORK MAKING MONEY FOR YOU

Before you buy, before you start a job—check with Heltzel! Heltzel better built curb and gutter forms in standard types will save for you. Special shapes designed by Heltzel to job specifications make difficult jobs click like run-of-mine work. Write for information now.



HELTZEL STEEL FORM & IRON CO., WARREN, O., U.S.A.

Please send information regarding:

CURB and GUTTER FORMS _____
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Of All That Is Best In Gasoline Engine Performance

... backed by experience gained in more than 30 years of continuous production and the building of more than 4 million air-cooled engines.

There are more Briggs & Stratton engines in service than all other makes of gasoline engines in their field combined—proof that they are "preferred power" the world over. Insist on Briggs & Stratton 4-cycle, single-cylinder, air-cooled engines to power your equipment.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

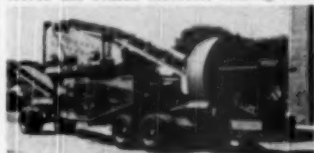


crusher, the Universal roller bearing hammermill and the Universal Simplicity gyrating screen. With these, clutch controlled folding conveyors, rotovator and necessary driving connections are all mounted on a single chassis, making the plant complete and highly mobile. The plant is shovel fed. Provision is made to power the hammermill separately.

21

Crushing Plant: Universal

A new secondary crushing, screening and loading plant is a product of the Universal Engineering Corporation, Cedar Rapids, Ia. A feature of this plant, exclusively Universal, is the 3.0 in. twin-dual roll crusher. This is a 2-stage reduction machine consisting of two double roll crushers mounted on a single set of shafts and bearings. One set of rolls receives the coarse material coming from



the top deck of the screen and acts as a roughing crusher. The second set of rolls of larger diameter than the first, acts as a finishing machine set to reduce the crushed material to specification size. Other equipment includes a 4 ft. x 12 ft. 2½ in. deck vibrating screen, three 30 in. conveyors, a 25 in. plate feeder, a rotovator (revolving elevator) and a heavy duty rubber-tired chassis. The plant has a crushing capacity of 60-100 cu. yd. of minus 1 in. material per hour and requires 125 H.P. to operate.

22

Rock Crusher: New Holland

A new model double impeller breaker was announced by New Holland Manufacturing Co., Mountville, Pa. Capacity of this Model 4040 is stated to be 150 to



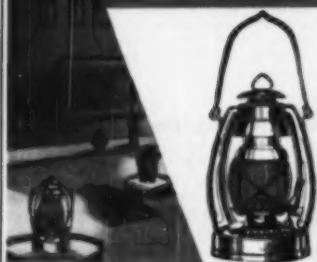
250 tons per hour breaking material to 2½ in. and minus in a closed circuit. This is based on average Pennsylvania Blue limestone and varies depending on the type and characteristics of material being crushed. Horsepower required is 150 to 200 (electric) or 220 (diesel).

23

Rock Crusher: New Holland

A new double impeller impact breaker designed for secondary crushing and small gravel installations has been added to the line of the New Holland Manufacturing Co., Mountville, Penn. The new Model 1212 will handle material passing a 12 in. square opening. It is designed to produce crushed aggregate as fine as 1 in. minus in a recirculating system. Weight of the model is 7900 lb. It has an

DEPENDABLE WARNING PROTECTION



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inlet feed opening of 12 $\frac{1}{2}$ in. x 12 $\frac{1}{2}$ in. Outlet discharge opening is 18 $\frac{1}{2}$ in. x 66 $\frac{1}{2}$ in. Bearings are self-aligning heavy duty anti-friction type. Either flat belt or V-belt drive can be used. Individual drives can be rigged to each rotor assembly or a single wrap drive can be used with idler pulley. Each rotor assembly weighs 1,039 lb., including the three 200 lb. rolls. The diameter outside the rolls is 21 $\frac{1}{2}$ in.

24

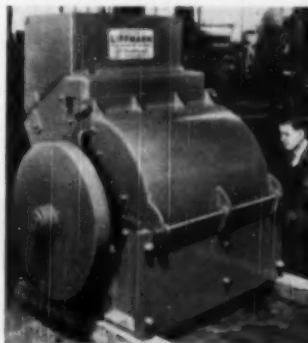
Rock Crusher: New Holland

A new model 3030 New Holland double impeller breaker designed for primary crushing was placed in production by the New Holland Manufacturing Co., Mountville, Pa. This was the second breaker now produced by New Holland for handling any stone passing a 30-in. opening. New design of the second model permits the feeding of longer slabs without bridging and results in greater production. The present Model 3030 will be used as a secondary crusher and as a primary crusher where unusually long slabs are not encountered. Major change in the Primary Model 3030 is the relocation of the adjustable breaker bar over one of the twin impellers in the breaking chamber. The present model has the bar directly over each impeller and a vertical path.

25

Pulverizer: Lippmann

A new 32 by 36 in. pulverizer announced by Lippmann Engineering Works, Milwaukee, Wis., embodies such engineered features as non-choke steep angle feed chute, expanding crushing chamber, spider type congestion relieving rotor,



forged hammer arms, four-edge wear abrasion resisting steel grate bars, one-piece four-edge wear hammers, and manganese and abrasion resisting steel armored wearing surface. The machine pictured here is destined for use in the production of ag-lime in Missouri and it is stated will turn out from 60 to 120 tons of ag-lime per hour.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Trailers

26

Trailers: La Crosse

Two new tilting trailers were announced by La Crosse Trailer Corporation, La Crosse, Wis. Manufacturer re-

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ports both trailers can easily be loaded or unloaded by one man without skids or blocks; and can be used behind any standard 1/4 to 1-ton truck equipped with standard pintle hook. Model TSA-2 has 8 to 10-ton capacity with 96 in. x 187 in. platform, riding on a single axle with 2 wheels and 4 9.00x15 or 10.00x15 tires. Lower priced La Crosse model LTA-4 has 6 to 8-ton capacity with 78 1/2 in. x 124 1/2 in. platform, riding on a tandem axle with 4 wheels and 4 7.00x20 tires.

27

Dump Trailer: Omaha Standard

A custom engineered dump trailer unit, designed to meet heavy hauling and dumping requirements, was announced by Omaha standard, 2411 West Broadway, Council Bluffs, Ia. Any type of high tensile reinforced steel body can be provided to fully meet



transportation requirements. Trailer chassis is of all structural steel construction. All main frame members are riveted. A specially designed hoist subframe distributes the load over entire length of chassis and provides a low mounting height.

28

Gravel Trailer: Omaha Standard

A custom designed center dump semi-trailer with gravel, dirt and rock body was developed by Omaha Standard, Council Bluffs, Ia. The unit has a very low center of gravity. A metered control to permit door openings from 4 in. to 16 in. is provided by means of a very simple hand adjustment. This can be pre-



set at any time, either loaded or unloaded. The specifications include: All structural-steel channel main chassis members. Body—10 to 8 gauge all steel, designed as an integral part of the trailer chassis to provide maximum strength with minimum weight for any and all road conditions. Heavy duty Timken tubular axle, single or tandem. Bendix Westinghouse air or vacuum brakes.

29

Tilt Deck Trailer: Rogers

A new tilt deck trailer, announced by Rogers Brothers Corporation, Albion, Pa., carries four 8.25 in. x 15 in.—14 ply tires and has a capacity of 7 tons. The road clearance is 16 in. The



deck is 16 ft. x 8 ft. and 34 in. high. Air or vacuum brakes are optional. An interesting feature is the double acting hydraulic ram which cushions the deck when being raised or lowered. A 5-ton trailer is also available equipped with 7.50 in. x 15 in.—10 ply tires.

Trailer: Martin

A new development to the line of "Carryhaul" trailers of the Martin Machine Co., Keweenaw, Ill., is a patented folding gooseneck, which, when lowered to the ground, forms a loading ramp, providing a uniform incline from the ground to the trailer platform. When the trailer is loaded, a power-operated winch on the truck-tractor raises the gooseneck to towing position. The entire procedure is a one-man operation.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

31

Scrapers

Scraper: Wooldridge

Three new models of cable-controlled earth-moving equipment were put in production by the Wooldridge Manufacturing Co., Sunnyvale, Calif. These include the Models BB-85 and BB-120 four-wheel scrapers and the BHD-19 bulldozer. Offering a wide, unobstructed front apron opening of 60 in., the new scrapers feature rear-draft fulcrum leverage and



pivot-tilt bowl. The BB-85 has a capacity of 8.5 cu. yd. struck and 11.0 cu. yd. heaped, while the BB-120 carries 12.0 cu. yd. struck and 14.2 cu. yd. heaped. Other engineering advances include higher yoke clearance and greater ruggedness throughout. The Wooldridge BHD-19 bulldozer for Allis-Chalmers' HD-19 tractor is designed for rugged service in straight bulldozing operations.

32

Scraper: Wooldridge

A new model TC-142 tractor drawn scraper put in production by Wooldridge Manufacturing Co., Sunnyvale, Calif., is specifically designed to stand up under roughest operating conditions and withstand the heavier stresses imposed by today's more powerful tractors. Capacities are 14.2 cu. yd. struck, 17.5 cu. yd.



heaped. Comparative tests show faster loading characteristics than previous models as a result of new 3-piece cutting edge. Wider 65-in. front apron opening and newly designed curved bowl ejector have been added to achieve faster complete discharge of load.



33

Earthmoving Equipment: LeTourneau

Three new units were added to the line of earthmoving and materials handling equipment of R. G. LeTourneau, Inc., Peoria, Ill. These are the E-35 Tournarocker, the E-40 Tournarocker and the E-25 carryall scraper.



Model E-35 Tournarocker

For bottom-dump hauling, the E-35 Tournarocker is a 27-yard or 35-ton capacity unit which will travel at speeds up to 30 m.p.h. It is powered by a 240 h.p., two-wheel prime mover, and has multiple-disc 4-wheel air brakes which provide 5135 sq. in. of braking surface.

The E-40 Tournarocker, a rear dump wagon, is also powered by a 240 h.p. two-wheel prime mover. The E-40 Tournarocker has a 41 cu. yd. capacity and a



Model E-40 Tournarocker

rear dump which is multi-cable controlled by an electric motor which tips the body beyond vertical position for fast dumping. Drive wheels are up front where they can pull the rig forward quickly in an emergency. Four-wheel disc type air brakes with 5135 sq. in. of braking area give safe control. The E-40 Tournarocker can make a 90° turn, and can take in an 18-ft. radius.



Model E-25 Scraper with Model B Tournapull

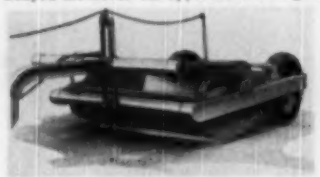
The E-25 carryall scraper, also is powered by the 240 h.p., two-wheel prime mover. Being supplied because of contractor demand, this Tournapull-scraper

possesses all the design features associated with the new line of LeTourneau equipment—fingertip electric control, positive power steer, Tournamatic differential, more flotation and sure-footed traction.

34

Scraper: Glenhill

A front dump type scraper, designed to work with wheel-type tractors or the smaller crawler type, was added to the line of The Glenhill Road Machinery Co., Gallon, O. The scraper has a capacity, struck measure, of 27 cu. ft. or 35 cu. ft. heaped measure. Its approximate weight



complete is 1,260 lb. It has an overall length of 11 ft. 6 in., and an overall width of 5 ft. 9 in. The cutting edge (blade steel) is 3/4 in. x 6 in. x 5 ft. The depth of cut is 0 in. to 6 in. and the ground clearance (carrying) is 8 in. The maximum depth of spread is 12 in. The controls are completely hydraulic.

35

Scraper: La Plant-Choate

The Model C-314 was added to the line of tractor drawn earth moving scrapers of La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. The new unit replaces the C-114. The Model C-314 has a capacity of 14 yd. struck and 17.5 yd.



heaped. It is particularly designed for use with the newer larger tractors. It can be equipped with a combination of different tire sizes starting with 18.00 x 24's up to and including 21.00 x 29's. Another feature of this unit is its interchangeability with the scraper unit S-300 of the TS-300 motor scraper.

36

Scraper: Gar Wood

Production was put under way by Gar Wood Industries, Inc., Findley Division, Findlay, O., on the newly improved line of Gar Wood, 4-wheel scrapers for the Allis-Chalmers fleet of industrial tractors. There are five models ranging in size from the Model 508, 7.6 cu. yd. capacity, to the largest scraper built,

Model 538, 28 cu. yd. capacity. Each scraper is fabricated and welded from steel to insure maximum strength and long life. Digging and loading are positive with a heavy duty cutting edge and extension cutting edge. For greater economy the cutting edge and extension cutting edge are reversible and replaceable. Large apron openings insure easy loading and ejecting of the loads.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Rollers

37

Grid Roller: Hyster

A new grid roller, announced by the Hyster Co., Portland, Ore., consists of two 5-ft. diameter wheels or rollers attached to a frame which is towed behind a tractor or motor grader. Each wheel is 32 in. in width and made of ten replaceable sections of heavy, heat-treated alloy steel grid segments bolted onto circular side plates. These grids have the appearance of a woven, open-mesh



grid made by interlacing 1½ in. round bars. Openings between adjacent bars are 3¼ in. square. The design of the grid surface with its closely spaced high pressure points surrounded by confined low pressure areas, is claimed to result in a high degree of compaction with minimum lateral shifting of material. In addition to its use as an earth compactor, the grid is stated to have another main purpose, that of salvaging and maintaining bituminous or black top pavement.

38

Tandem Rollers: Buffalo-Springfield

Three new variable weight tandem roller models—the KT-14 from 5 to 7 tons, the KT-19 from 8 to 12 tons, and the KT-20, 10 to 14 tons—were announced by the Buffalo-Springfield Roller Co., Springfield, O. Furnished with either gasoline or diesel engines, the new models have many of the basic features of



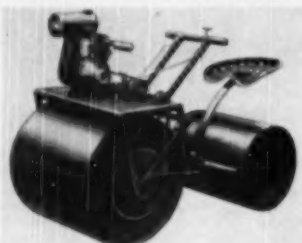
the well known "B" series or heavy duty Buffalo-Springfield tandems. A gear type oil pump supplies the low pressure hydraulic steering system, while two high speed-low torque clutches permit revers-

ing the roller without shifting gears. A single unit engine transmission and bevel gear final drive provides a simplified compact power train.

39

Small Tandem Roller: Gabb

A new small roller designed especially for asphalt road patching, was placed on the market by Gabb Manufacturing Co.,



East Hartford 8, Conn. The roller weighs 265 lb. empty and 600 lb. fully loaded with water ballast. Powered by a 1½-hp. Briggs & Stratton motor; has a width of 29½ in.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Engines

40

Gasoline Engines: Briggs

Three new models in their current line of 4-cycle air-cooled gasoline engines were announced by Briggs & Stratton Corporation, 2711 N. 13th St., Milwaukee 1, Wis. Model "9" is rated at 2.16 to 3.1 h.p.; Model "14", 3.56 to 5.1 h.p.; and Model "23" at 6.5 to 8.25 h.p.

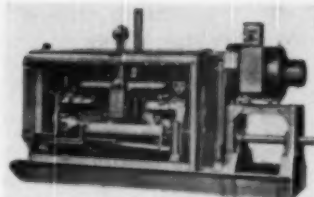


The ratings are based on standard I.C.E.L. procedures. Among the many new features of these models is the Briggs & Stratton magnamatic ignition system. A breaker box unit, externally mounted on the crankcase, incloses easily adjustable breaker points, condenser, manual stop switch and remote stop switch terminal.

41

Mech-Elec Diesel Unit: Murphy

What is believed to be the first "packaged" diesel power unit capable of providing both electricity and mechanical driving power simultaneously was announced by the Murphy Diesel Co., Milwaukee 14, Wis., who call their new power plant, the Mech-Elec Unit. Any fixed or variable proportions of mechan-



ical and electrical loads can be handled providing the combined total does not exceed the rated capacity of the engine and that the electrical load does not exceed 50 K.W. Generator can be operated without engaging mechanical drive. Two models are currently available, the Model ME-6, rated at 135 H.P. continuous, 160 H.P. intermittent and the Model ME-66, rated at 150 H.P. continuous, 180 H.P. intermittent. Both models are equipped with 50 K.W. generators.

42

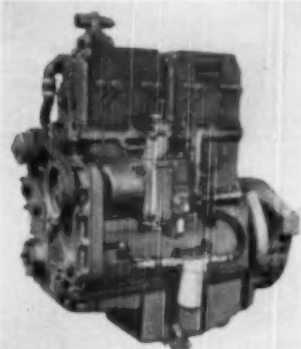
175-hp. Diesel Engines: Cummins

Two new six-cylinder, highspeed diesel engine models designed for on-highway and off-highway automotive applications were placed in production by the Cummins Engine Co., Inc., Columbus, Ind. Both the HRBB-600 (highway) and HRBH-600 (off-highway) models have a maximum rating of 175 hp at 2,000 rpm. They are specifically designed for use on automotive applications where there is a need for the flexibility of higher rotational speeds and the performance of higher horsepower. Features of the two new engines are: (1) Fully counterbalanced crankshaft. (2) Camshaft of new design. (3) Viscous-type torsional vibration damper. (4) Revised fuel pump.

43

Diesel Engine: Cummins

A new 4-cylinder Cummins diesel engine with a maximum rated horsepower at 110 at 1800 rpm was placed in production by the Cummins Engine Co., Inc., Columbus, Ind. The new HR-400 is light in weight and compact in size. Mounting dimensions for the basic industrial model are 43 7/32 in. x 29 1/2 in. x 47 1/2 in. The new HR-400 has a 5½ in. bore and a 6



inch stroke, and a piston displacement of 495 cu. in. Like all Cummins diesels, the HR-400 is a four-cycle engine, and uses the exclusive Cummins fuel system. This new 4-cylinder Cummins diesel is available in an automotive model, five industrial models with special equipment making them applicable to various types of industrial applications.

44

Diesel Engine: Cummins

A new supercharged NHRS-600 diesel engine was put in production, by the Cummins Engine Co., Inc., Columbus, Ind. Available in automotive, industrial and marine models, the new and improved high-speed diesel engine develops 300 hp at 2100 rpm. The NHRS-600 is patterned after the proved design of the NRS-600, and continued the Cummins policy of developing diesel engines with lower weight per horsepower. Outstanding characteristics claimed for the new engine include: A rated output of 300 hp at 2100 rpm. A reduction in fuel consumption in the high horsepower output operating range. A completely new fuel pump based on proved Cummins principles of fuel metering and injection but 56% smaller in size and 65% lighter in weight. A fully counter-balanced crankshaft, improved piston design, and improved tubular type lubricating oil cooler. The same size and installation dimensions as the Cummins NRS-600 engines except for the smaller fuel pump and new oil cooler.

45

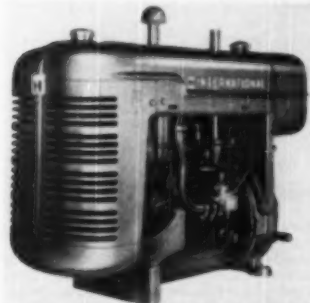
Diesel Engine: Cummins

Production of a new supercharged Cummins diesel engine for industrial applications was announced by Cummins Engine Co., Inc., Columbus, Ind. The addition to the Cummins line is designated Model HRBS-600 and develops 225 hp at 1800 rpm. Like all Cummins diesels, it employs the four-stroke cycle principle of operation, and the exclusive Cummins fuel distribution and injection system. Other mechanical features include standard two-valve heads, continuous groove main bearings, increased flow lubricating system, buttress-type oil pan and flywheel housing, a newly-designed lubricating oil cooler and a Roots-type blower. Deliveries of the new Cummins diesel began Feb. 1. In addition to the industrial model, an automotive engine, Model HRBS-600 was placed in production at the same time. Other industrial and marine models will be announced.

46

16 H.P. Engine: International Harvester

A new 4-cylinder gasoline engine for a wide range of "Cub-horsepower" applications, the International U-1, was announced by the Industrial Power Division of International Harvester Co., Chicago, Ill. Stripped, the U-1 delivers a maximum of 16.3 brake horsepower at 2500



r.p.m. It develops a maximum of 16 working horsepower equipped with fan, radiator and air cleaner. Overall dimensions

of the engine are: 26 13/32 in., length; 16 11/32 in., width; 25 in., height. The engine itself weighs approximately 280 lb.; the complete power unit 450.

47

Diesel Engine: Harnischfeger

A new two cylinder, two cycle, light weight, metal alloy diesel engine was announced by Harnischfeger Corporation, Diesel Engine Division, Port Washington, Wis. The new engine uses the patented P & H cylinder head and liner assembly.

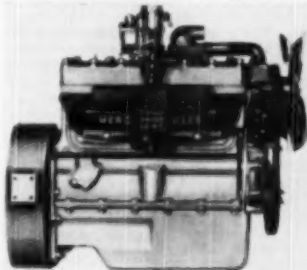


The cylinder head is interchangeable from one engine to another and is removable in a period of 40 minutes. The engine is 28 1/4 in. wide, 40 1/2 in. high and 32 1/4 in. long. Weight, complete with cast light metal alloy block, 1030 lbs. with a horsepower rating of 52.5 at 1400 rpm.

48

Gasoline Engines: Hercules

Further expansion of its extensive line of 2, 4 and 6-cylinder high speed, heavy duty gasoline engines was announced by the Hercules Motors Corporation, Canton, Ohio, with the addition of the "JX4" series of 4 cylinder models. These consists of: Model "JX4E," 3 1/2 in. bore and

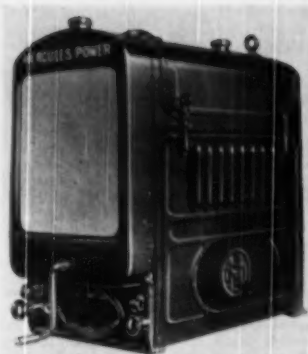


4 1/4 in. stroke, 164 cu. in. displacement. Model "JX4C," 3 1/2 in. bore x 4 1/4 in. stroke, 188 cu. in. displacement. Model "JX4D," 4 in. bore x 4 1/4 in. stroke, 214 cu. in. displacement. These new Hercules 4-cylinder gasoline engines are for general purpose power application. They parallel in design the popular "JX" series 6 cylinder engines.

49

Gasoline Engines: Hercules

Three new 4-cylinder gasoline power units, the Models JX4E, JX4C and JX4D, were added to the line of Hercules Motors Corporation, Canton, O. The Model JX4E has a 3 1/2 in. bore x 4 1/4 in. stroke and 164 cu. in. displacement;

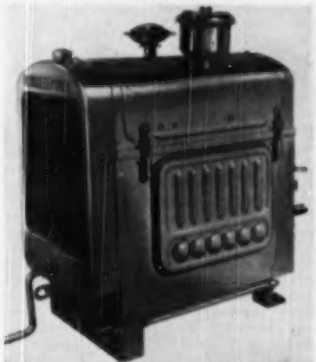


JX4C, 3 1/2 in. bore x 4 1/4 in. stroke and 188 cu. in. displacement and JX4D, 4 in. bore x 4 1/4 in. stroke and 214 cu. in. displacement. The new models follow definite standards of design and construction established by Hercules as practical in meeting the severe services to which these power units are subjected.

50

Power Units: Hercules

To meet a demand for broader application of the "DIX4" Series of 4-cylinder diesel engines, Hercules Motors Corporation, Canton, O., made available two models—the DIX4B and DIX4D—as closed type power units. This is in addition to the automotive type mounting. The Her-



cules "DIX4" Series of diesel engines are built in two bore sizes. The Model DIX4B is 3 1/2 in. bore x 4 in. stroke with a piston displacement of 133 cu. in. The Model DIX4D is 3 1/2 in. bore and 4 in. stroke and has a piston displacement of 164 cu. in. The Hercules "DIX4" Series, like all Hercules diesel engines, are the solid injection, compression ignition, 4-stroke cycle type.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Trucks

51

Truck: Federal

A new 1/2 to 2 ton Model 15 M truck was added to the line of Federal Motor Truck Co., Detroit, Mich. Gross vehicle weight for this truck ranges from 12,000 to 14,500 lbs. depending upon tire size.



The gross combination weight of the model 15M with dual rear tires is 28,000 lbs. It is available in five wheelbase lengths: 135 in., 146 in., 167 in., 189 in., and 194 in. A 6-cylinder Hercules engine with a 245 cu. in. displacement provides power for the new Model 15 unit. It has a seven main bearing, counter weighted and statically balanced crankshaft, removable precision copper-lead main and connecting rod bearings. The engine develops 93 hp. at 3400 rpm. and 184 lbs. ft. torque at 1400 rpm. Standard equipment also includes an 11 in. clutch with 131.4 sq. in. of lining area which is unusually large for a truck of this size.

52

Truck: Federal

Two new high speed heavy duty diesel series trucks comprising five models in the medium price field of both conventional and six-wheeler design were introduced by the Federal Motor Truck Co., Detroit, Mich. All of the diesel models were powered with a light weight, high speed heavy duty Federal-Hercules model DWXLD diesel engine developing 142 hp at 2600 rpm. The gross torque output is



332 lbs. ft. The D45 series is available in three models with a choice of single speed or 2-speed double reduction rear axle. These models have a nominal rating of 3½ to 5 tons, a gross vehicle rating of 26,000 lbs. and a gross combination weight of 50,000 lbs. The D645 six-wheeler series diesel is available in addition to the D45 offers unusual fuel economy and power characteristics not usually found in vehicles of this weight classification for either heavy duty on or off the highway service. Having a gross vehicle weight of 38,000 lbs., the D 645 diesel is available in two models with a choice of a tandem double reduction or worm drive rear axle.

53

6-Wheel Truck: Dodge

A new 6-wheel series of Dodge "Job-Rated" trucks with tandem dual drive rear axles for rugged uses up to 34,000 lbs. gross vehicle weight was offered by the Dodge Division, Chrysler Corporation. Designated as the B-1-VX model, the 6-wheelers are available in three wheelbases, 154, 172 and 190 in. Equal power is transmitted to both rear axles by the heavy-duty two-speed torque divider with inter-axle locking differential. Ratios are selected by convenient cab control. Separate propeller shaft from the torque divider to each axle transmit equal torque to both rear axles. The unit is especially engineered for tough jobs. The torque rods are arranged in a parallelogram to keep axles in correct alignment regardless of their relative positions. Full floating rear spring suspension equalizes the load between the two

rear axles. Among the outstanding features of the new six-wheelers is the heavily constructed frame with full-depth outside channel type reinforcements to the end of the frame. One hundred per cent air brakes are standard equipment.

54

New Trucks: Dodge

A new and expanded line of trucks comprising 356 basic gross vehicle weight models was announced by the Dodge Division, Chrysler Corporation, Detroit, Mich. The Dodge "Job-Rated" truck line now ranges from 4250 to 23,000 lb. gross vehicle weight and up to 40,000 lb. gross combination weight. Nominal ratings have been increased to include some 2½ and 3½-ton models.



Among the many new features announced on the new B-2 Series are: an electrical system which assists in improving engine performance, a new 5-speed synchro-shift transmission, a new 5-speed synchro-shift overdrive transmission, cyclebonded brake linings as standard equipment on all models, and a steering column gear-shift and a convenient hand brake under the center of the cowl on ½, ¾ and 1-ton models. One completely new engine is among the seven offered in the new line.

55

Diesel Powered Trucks: International Harvester

Two new diesel-powered trucks, Models KBD-12 and KBRD-14 with GVW ratings of 31,500 lb. and 35,000 lb., respectively, were announced by International Harvester Co., Chicago, Ill. The KBD-12 is available in four wheelbases, 155, 161, 179 and 215 in. The KBRD-14 model is available with 161, 179 and 215-in. wheelbase. The power plant of these new models is the new HRR-600 Cummins diesel which develops 165 maximum horsepower at 1800 r.p.m. The KBD-12 is available with single or double reduction drive or two-speed rear axles, each available in three axle ratios. The KBRD-14 offers an option of either double-reduction final drive (five ratios) or two-speed rear axle with 6.41 and 8.38 ratios. Transmissions of both models are of the five forward speed type with either direct in fifth or overdrive fifth speed. Except in the 155-in. wheelbase chassis, two optional auxiliary transmissions are available to meet operating requirements.

56

35 Cu. Yd. Truck Body: Marion Metal

A new hopper type truck body designed to haul about 26 tons of coal was built by Marion Metal Products Co., Marion, O. Four of these new large



capacity bodies were recently delivered to the West Virginia Coal and Transportation Co. This new Marion hopper body has a capacity of 35 cu. yd. Inside dimensions are 26 ft. long and 90 in. wide. The air-operated hopper doors are 8 ft. long and 3 ft. wide, and are unlatched and closed by controls in the truck cab.

57

Trucks: Ford

Engineering changes incorporated in Ford trucks in the 18 months following the introduction of the current series have resulted in steady expansion of the line. The changes permit better adaptation of the trucks to a wider range of operation. Included among some of the more important items are: Availability of air brakes on 21,500 gross vehicle weight rating F-8 series, the largest Ford trucks ever built. These brakes will be provided as optional equipment. Heavy duty three-speed transmissions as optional equipment for F-1, F-2 and F-3 series Ford trucks. Ratios of these transmissions are: low gear, 3.714; second gear, 1.871; third gear, direct; reverse, 4.548.



A 176-in. wheelbase model has been added for the F-5 and F-6 series. The F-7 and F-8 series have additional wheelbase lengths of 147 and 178 in. F-7 series trucks are now equipped with dual cylinder type 15 in. x 5 in. rear brakes. The 145 hp. engines in both F-7 and F-8 series now have new type exhaust valves.

58

Trucks: International Harvester

A completely re-designed and re-engineered line of International trucks, entirely new from front bumper to tail light, was announced by the Motor Truck Division of International Harvester Co., Chicago 1, Ill. The new L-line, a complete line of heavy-duty-engineered



trucks consists of 87 separate truck chassis models designed to handle every conceivable type of hauling job. The new L-line features: Complete restyling that blends a new modern truck streamlining with extreme practicability. A new "Comfo-Vision" cab, custom-designed to provide more roominess, added comfort and new all-round visibility. New chassis di-

mension engineering that permits better load distribution, greater maneuverability, shorter over-all lengths and improved engine accessibility. New, improved valve-in-head International truck series engines, including an all-new Silver Diamond engine.

59

Truck: Kalamazoo Mfg. Co.

A three speed forward and reverse, heavy duty truck, built like a tractor, announced by Kalamazoo Manufacturing Co., Kalamazoo, Mich., is designed to accommodate two different types of bodies—a



% yd. dump body and an all-steel platform body. The unit has a wheel base of only 56 in., with front tread of 34½ in., and rear tread of 10 in. Overall dimensions with either the dump body or platform body with side and end gates on, are: 85½ in. long overall; 41½ in. from ground to top of box; 42 in. wide overall; 50¼ in. high overall; and ground clearance of 7½ in. Shipping weight approximates 1,300 lbs.

60

Trucks: GMC

A new line of all-new heavy duty models was announced by GMC Truck & Coach Division of General Motors. There are 61 basic gasoline and diesel models in the new "H" line, with gross vehicle weights ranging from 19,000 to 75,000 lbs., and gross combination weights up to more than 90,000 lbs. for vehicles used in off-the-highway operation. The new heavy duty models feature more powerful engines, stronger chassis and roomier cabs than ever before, plus massive new functional design. A number of new models have been added to the line to meet the requirements of certain specialized hauling operation. There are new high-speed tractors for fast freight hauls... the "640" series with a 177-hp engine and the "740" series with a 190-hp engine or the 4-71 diesel power plant. There are new gas and diesel 6-wheelers with gross vehicle weight ratings ranging from 38,000 to 75,000 lbs. for extra heavy jobs, new diesel-powered dump chassis and tractors.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Front-End Loaders

61

Front-End Loader: Meili-Blumberg

A new front-end loader for attachment to graders and maintainers was announced by Meili-Blumberg Corp., New Holstein, Wis. The design is also said to be such as to permit installation on all M-B graders and maintainers already in operation. The operation of the loader is independent of the grader blade, scarifier or leveling wheels. The loader is equipped with a standard ½ yd. bucket for handling dirt, sand, gravel and ma-



terials of this type. A 1-yd. bucket is available for handling snow and other light bulky materials. The bucket when in dumping position has a clearance of 8 ft. 6 in.

62

Scoop with Fluid Drive: Mixermobile

Mixermobile Manufacturers of Portland, Ore., announced the adaption of Chrysler fluid drive to the Wagner-Mobile Model "C" Scoop. This scoop is a versatile unit with scoops in five sizes and many other attachments including



% cu. yd. concrete hopper, crane boom, lift forks, and fertilizer or hay forks. Attachments can be quickly changed on the job by one man. The load lifting capacity is 4,000 lb.

63

Loader: Mixermobile

A new Model C Wagnermobile scoop announced by Mixermobile Manufacturers, Portland 16, Ore., is a further refinement of previous models with one of the main improvements being the addition of planetary drive gears to each of the drive wheels. Instead of direct drive to the wheels, the axle now drives heat treated sun gears that transmit the power to the drive wheels at a gear reduction of 3 to 1. The Wagnermobile scoop can still be towed behind a truck or pickup at speeds over 20 m.p.h. by disengaging the planetary drive.

64

Shovelloaders: Lull

Three new models, 4-AT, 4-BT, 4-CT, Shovelloaders, were announced by the Lull Manufacturing Co., 3612 East 44th St., Minneapolis 6, Minn. The new series of Shovelloader models are equipped with a special fork attachment with a hydraulically controlled "holddown" finger, lifting fork control cylinders, 3 valve sections, 3 conveniently located control lev-

ers and a rear ballast box. Other standard Shovelloader attachments can be used with the new unit by interchanging them



with the lifting fork attachment. These attachments include material buckets, combination coal and snow buckets, cranes, bulldozers and independently powered sweepers.

65

Shovelloader: Lull

A new model 3-A shovelloader for mounting on the Case VAI tractor was announced by the Lull Manufacturing Co., 3612 East 44th St., Minneapolis 6, Minn. Outstanding features claimed for



the new Model 3-A include automatic "scooping action," split-second or slow dump, and the unique design which keeps the load in balance and free from spillage after the bucket is filled. The loader has a maximum lifting capacity of 1,800 lb. and can be equipped with either a ¾ cu. yd. material bucket or a ¾-l cu. yard snow bucket.

66

Front End Loader: Tractomotive

A new materials handling loader was placed in production by Tractomotive Corporation, Deerfield, Ill., the company that builds the Tracto-Shovel for the Alis Chalmers Model HD-5 Track-Type Tractor. This new unit, called the TL-W



Tracto-Loader, has a ½ cu. yd. standard bucket. It is mounted on rubber tires and has the bucket over the driving wheels and the steering wheels in the rear. The TL-W's has an overall length of 12 ft. with bucket down, and a width of 5 ft. 9 in. (outside tire measurements).

67

Loader: Tractomotive

A new materials handling loader, the Model TL-B Tractor-Loader, with a 10 cu. ft. standard bucket, has been announced by Tractomotive Corporation, Deerfield, Ill. It is similar in design to the ½ cu. yd. TL-W, recently introduced by this company. It also has the bucket over the driving wheels and the steering wheels in the rear, which, according to the manufacturer, result in unusually good traction and easier steering. It is



mounted on rubber tires, and has a hydraulically controlled bucket that can be dumped in whole or in part to a height of approximately 5 ft. The bucket has a forward crown action and an automatic "tilt-back" feature that permits getting a load without ramming. Overall length with bucket down is 9 ft. 5 in.; overall width, outside tire measurements, is 4 ft. 6 in.; and the wheel base is 4 ft. 1 in. Major tractor components are from Allis-Chalmers tractors. Brake horsepower is 27.8.

68

Loader: Mandt

A new loader announced by The Mandt Mfg. Co., Columbus, O., features full hydraulic operation, 180° swing and quick change convertibility to mobile crane or backhoe. As a loader, the unit is designed for standard $\frac{3}{4}$ yd. material bucket and up to 2 yd. snow handling bucket. It is



capable of loading from any point in a 10 ft. wide swath and also above grade and can swing 90° to either side to dump, permitting work within 2 ft. of trucks. The loader is quickly converted to an excavator and trencher by installation of $\frac{3}{4}$ yd. backhoe attachment in place of loader, or to a mobile 3-ton crane operating boom of 10 to 23 ft. length which can be swung 180° without outriggers to pick up or place loads.

69

Shovel-Loader: Dempster

A combination shovel-loader, announced by Dempster Brothers, Knoxville, Tenn., works on a hydraulic crowd and hoist principle. It is designed to dig hard materials as well as to handle loose

materials. It is claimed to be able to dig 15 in. below grade and to a height of 15 ft. above grade. It has a clearance for dumping of 10 ft. 6 in. It has a variable crowd action at any digging position. It has dual steering wheels and a 16 ft. turning radius. The machine is powered by a 110 h. p. 6-cylinder gasoline engine. A 90-h. p. 8-cylinder diesel engine is optional.

70

Scoop Loader

A new front end loader attachment announced by The Galien Iron Works & Mfg. Co., Galien, O., is designed for quick easy attachment to the Galien No. 402 maintenance motor grader. Lifting operation is by hydraulic power under fingertip control from the grader seat. Operation is independent of scarifier. Loaded bucket is tripped by manual cable control. According to the specifications, the



capacity of the standard material bucket is 9 cu. ft. An extra-large snow bucket is available. Maximum lifting height is 9 ft. 10 in.; dumping clearance 8 ft.; forward reach 4 ft. 6 in.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 74. Each item is numbered. Just circle the corresponding number on the card and mail.

Compressors

71

Air Compressor: Jaeger

A heavy duty complete and ready-to-operate air power plant in a 60 cfm unit was added to the line of The Jaeger Machine Co., Columbus, O. This "Packaged 60" consists of 2-stage, v-belt-driven, air-cooled compressor and 15-hp electric motor, mounted on an 8.5 cu. ft. air receiver



with base, and all electrical controls. The compressor is the maker's well-known "Air-Plus" unit, with two low-pressure and one high-pressure cylinders, arranged in "W" form for maximum balance, ease of operation, and minimum vibration.

72

Compressor: OK Clutch

A new compressor announced by O.K. Clutch and Machinery Co., Columbia, Pa., uses Ford motor and standard automotive parts, which can be obtained at any United Motors Service station. The com-



pressor weighs 950 lb. and with skid mounting and 1,100 lb. with trailer mounting. It delivers 60 cu. ft. of free air and can be easily towed or carted to the job. Air tank capacity is 4 cu. ft. Use of an extra large air receiver enables maintenance of greater air supply without overworking parts. It is water jacketed to protect against overheating for efficient operation in all climates.

73

Speed Regulator Compressor: Schramm

A new feature on the complete line of portable engine-driven compressors in sizes including Model 105, 210, 315 and 420 of Schramm, Inc., West Chester, Pa., is a unit designed to regulate the speed of the compressor in accordance with air demand. This unit is known as the Schramm Pneumastat. As the pressure increases, the Pneumastat adjusts itself



to balance the throttle in a new position, thereby reducing the speed of the compressor. With this arrangement the compressor operates continuously from about one-half to full capacity with loading and unloading, thereby eliminating at part load, the cycling between full speed and idle speed.

74

Compressor: Schramm

One of the features of the new 105 Unistage Compressors, announced by Schramm Inc., West Chester, Pa., is the fact that the 4-cylinder Schramm engine operating the 4-cylinder compressor complement one another and 90% of the engine parts are interchangeable with the compressor, which reduces the carrying of service parts to a minimum. With an actual air delivery of 105 cu. ft. this unit is also equipped with the Schramm Pneumastat assuring variable speeds and the elimination of continuous loading and unloading. Simplified design is stated to have resulted in a rugged outfit capable of 24 hours continuous service and the elimination of two staging and inter-coolers.

75

Compressor: Ingersoll-Rand

For users who prefer full diesel-engine drive for their compressors, a new 500 cfm. Mobil-Air was announced by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The engine is the well-



known International Harvester heavy-duty UD-34 which starts easily as a low-compression gasoline engine and after a short warmup period is shifted to full diesel operation by means of a single lever. This portable, known as the IKA-500, has all the features used on Ingersoll-Rand's KA-Series Mobil-Air compressors in sizes from 100- to 600-cfm.

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Air Tools

76

Sinker Drill: Gardner-Denver

A new 45-lb. class sinker of advanced design, was announced by Gardner-Denver Co., Quincy, Ill. Designed for either wet or dry drilling, this S48 can be changed from wet to dry or to automatic air-operated water control merely by changing the easily removed gland and tube. The conversion is made without taking the drill apart, and without changing the backhead. An improved steel puller on the S48 has no nuts to work loose, can be swung clear of the chuck when desired. A new type water connection swivels freely; yet is said to have a leak-proof water seal. The air cleaning screen is designed to clean itself during blowing.

77

Paving Breaker: Independent

A new 70 lb. pneumatic paving breaker was announced by the Independent Pneumatic Tool Co., Aurora, Ill. The new Thor "24" paving breaker is a companion machine to the Thor 84 lb. breaker, the Model "25." The new Thor breaker has a 28 in. overall length; 1 1/2 in. x 6 in. (1 1/4 in. x 6 in. optional) chuck sizes for collared steels; 3/4 in. hose size; and 3/4 in. hose inlet pipe thread.

78

Air Tools: Worthington

Worthington Pump and Machinery Corporation, Harrison, N. J., announced three newly-designed Blue Brute air tools for the construction equipment field—a clay digger; a trench digger; and a breaker—manufactured at the Corporation's Holyoke, Mass., works. The new tools feature refinements in design and manufacture, and include a four-bolt handle; built-in lubricator; replaceable bronze cylinder bushing; replaceable chuck bushing; and interchangeable handles. Two major advancements are incorporated in the new design: a streamlined latch-type retainer enables trim-

ming and breaking in close quarters without damaging the retainer fulcrum pin because there are no side projections; and a new, simple metering-type valve which is unaffected by wear. The new design provides larger bearing surfaces and shorter piston travel, which lengthens the life of the tools.

79

Paving Breaker: LeRoi

A new type heavy paving breaker, the 52AJ-Air Jac, put in production by LeRoi Co., Milwaukee, Wis., has an integral air lift cylinder that utilizes line air pressure to lift the tool and pull stuck steels. This relieves operator of heavy lifting

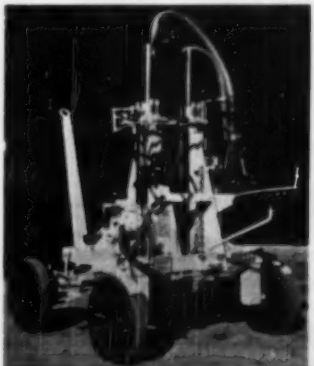


normally associated with 80 lb. class paving breaker operation. The Air-Jac lift cylinder has a leg parallel to the breaker steel through which the lifting force of 100 lb. is exerted. After penetrating pavement in a normal manner, line air pressure is applied to the lift cylinder through a control at the breaker handle.

80

Pavement Breaker: Rapid

New features incorporated in the Mighty Midget pavement breaker of the Rapid Pavement Breaker Corporation, 2781 East 11th St., Los Angeles, Calif.,



are claimed to permit greater ease of handling and to produce important gains in yardage of concrete broken. All controls are within easy reach of the opera-

tor's seat which is placed directly behind the machine, allowing the operator to see exactly where and how the hammer contacts the pavement at all times.

81

Paving Breaker: Cleco

A new RC-80 paving breaker was added to the line of pneumatic tools of the Cleco Division of Reed Roller Bit Co., Houston, Tex. This tool incorporates the new Reed-Cleco rock drill type valve which gives full control of both power and reserve stroke. The reversible grooved piston is cushioned on the power and return stroke, reducing operator fatigue and eliminating side rod breakage. An air reservoir in the back head assures uniform air pressure to the piston. Over-size air porting assures longer effective stroke and full pressure on the piston during the power stroke. A large oil reservoir provides automatic lubrication and a pressure seated throttle valve gives positive shut-off and accurate control.

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Graders

82

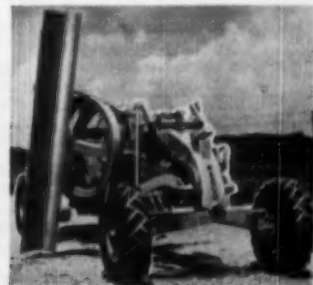
Grader: Gledhill

A new light grader, announced by The Gledhill Road Machinery Co., Gallon, O., features primarily the longer (or higher) reach of the blade (8 ft., 9 ft., or 10 ft.) and simplified leaning wheel construction. Among other features are its (1) pneumatic tires, (2) self-locking raising and lowering device (3) automotive type steering gear, (4) all gears in oil tight cases, and (5) Timken tapered roller bearings.

83

Motor Grader: Warco

A new general duty motor grader, Warco's 76 h.p. model 4D-76, announced by W. A. Riddel Corporation, Bucyrus, Ohio, incorporates the many new features already built into the Warco 4D-100 which went into heavy-duty service earlier in 1949. Working advantages



claimed for these two Warcos include: a blade which (1) revolves in a full circle without removing scarifier or teeth, and (2) travels from 50° elevation on one side to 90° elevation on the other without the operator leaving the cab; effortless hydraulic control; a sliding moldboard for extra side reach; powerful Diesel motor; and ample working clearances.

6 REASONS WHY YOU CAN BANK ON THE

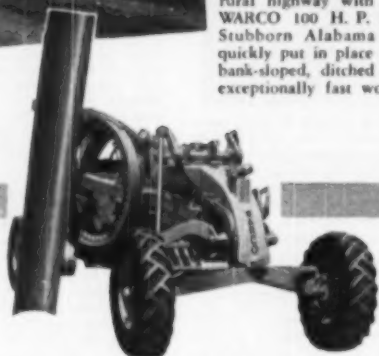
WARCO

high productive factor



- Completely cab-controlled blade travel from 90° on one side to 90° on the other
- Retractable scarifier, blade revolves 360° without removing scarifier or teeth
- Sliding moldboard
- High working clearances, front and rear
- Mechanical steering with hydraulic booster
- Interchangeable wheels

An almost impassable road in Lamar County, Alabama, becomes a two-lane rural highway with the help of a WARCO 100 H. P. Motor Grader. Stubborn Alabama red clay was quickly put in place as the operator bank-sloped, ditched and shaped in exceptionally fast working time.



High-angle bank cutting or routine grading . . . whatever assignment you give your WARCO Motor Grader, it continues to deliver an amazingly high productive factor. Why? Because its finger-tip hydraulic controls and speedily positioned blade help to turn out more work in fewer hours . . . and every foot it travels is a foot it works. That's why you can bank on the WARCO high productive factor.

See the WARCO . . . compare its construction, operation, performance . . . then you'll decide that your next motor grader must be a WARCO.

4D-100 WARCO Heavy Duty 100 H. P. Motor Grader

4D-76 WARCO General Duty 76 H. P. Motor Grader

W. A. RIDDELL CORPORATION

BUCYRUS, OHIO

84

Grader: Gledhill

A new Hi-Lift grader announced by The Gledhill Road Machinery Co., Galion, O., has a combination leaning and steerable wheel with the same rotating mechanism. This leaning wheel and steering feature is accomplished with one set of gears. Additionally the independent steering of both front and rear wheels enables the grader to be put in difficult positions on the job. Another new fea-



ture on the grader is a combination automotive steering which has built into it an offset hitch which permits the tractor or motive power to remain on good footing while the grader can be steered laterally when needed. Its bank sloping features permit a wider and higher reach of the blade whether equipped with an 8-9-10 ft. moldboard. This grader is a standard 8 ft. grader weighing 4,000 lb.

85

Units for Motor Grader: Tractomotive Corp.

A rear-mounted bucket loader and a V-type hydraulically controlled snowplow were introduced as specially designed allied units for the new Model D motor grader of Allis-Chalmers Tractor Division, Milwaukee 1, Wis. The rear-mounted ½ cu. yd. loader manufactured by the Tractomotive Corporation, Deerfield, Ill., has been built to take advantage of the new Model D's many outstanding features. Loaders are shipped knocked down to the dealers and can be installed in the field with ordinary me-



chanic's hand tools since no cutting, drilling or welding is required . . . four simple sturdy clamps attach loader to grader frame. A V-type hydraulically controlled snowplow manufactured by the Baker Manufacturing Company, Springfield, Ill., is the other piece of special allied equipment designed to increase the year 'round capacity of Allis-Chalmers' new Model D grader. A bulldozer blade that is interchangeable with the V-plow is available to further increase overall versatility. The new Baker V-plow is 8 ft. wide at the bottom, 9½ ft. wide at the top. It is flexibly attached to the push bars and hydraulically adjustable for correct snow moving positions.

86

Rake Attachment for Graders: York

A new rake attachment for motor graders announced by York Modern Corporation, Unadilla, N. Y., has 66 alloy steel heat treated teeth, attached to high carbon spring steel heads. The teeth are 5/16 in. x 1¼ in. x 28 in. There are 51 teeth on the long head and 15 teeth on the short head. The rake lift is handled

by a hydraulic hand pump with single acting cylinder. The attachment weighs 1150 lb., and the frame is constructed of structural steel, electrically welded. The length over all is 15 ft. 4 in. and the working width with rear section of rake extended is 9 ft. 4 in. The working width with rear section of rake retracted is 8 ft.

87

Motor Grader: Warco

A new Warco 4D-100 extra heavy duty motor grader was announced by W. A. Riddell Corporation, Bucyrus, Ohio. This new grader was the first built by Riddell in the 100 H. P. class. Outstanding "on the job" advantages claimed for the new



Warco include: full 360° revolving of the circle without removing the scarifier or teeth; less operator fatigue because of easy hydraulic control; unusual blade reach; and exceptional clearances under the front axle and transmission.

88

Motor Grader: Allis-Chalmers

A completely new 37.4 hp 8,500 lb. Model D motor grader announced by the Allis-Chalmers Tractor Division, Milwaukee, Wis., introduces to the low-priced grader field, several popularly accepted big grader features such as tandem rear-wheel drive, tubular frame design, and rear-mounted engine-transmission construction for improved visibility. It has

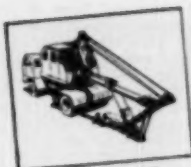


been specifically engineered for low cost maintenance and light construction work. Among a number of exclusive Allis-Chalmers features in the new Model "D" is the tubular frame design. Another popular Allis-Chalmers design incorporated in the new "D" is the "Roll-Away" moldboard. An abundant throat clearance from the moldboard to the circle bottom enables the new "D" to accommodate capacity loads that pass through the arched front axle without disturbing the rolling action of the load. Model "D" has an extensive blade range planned to meet a variety of maintenance needs.

89

Grader: Allis-Chalmers

A new BD-3 motor grader was announced by the Tractor Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. This has many features of earlier Allis-Chalmers graders in addition to new developments. The grader is powered by a 78 brake h.p. General Motors 2-cycle diesel engine and has six speeds forward, ranging from 2.21 m.p.h. to 15.58 m.p.h. and three reverse speeds ranging from 2.64 m.p.h. to 5.74 m.p.h. A tubular frame gives the unit a strong rigid backbone. Mechanically controlled front-mounted lift cases provide direct down-pressure which, in turn, maintains rigid blade settings measured to a fraction of an inch. A 28 in. throat clearance



TRENCHING

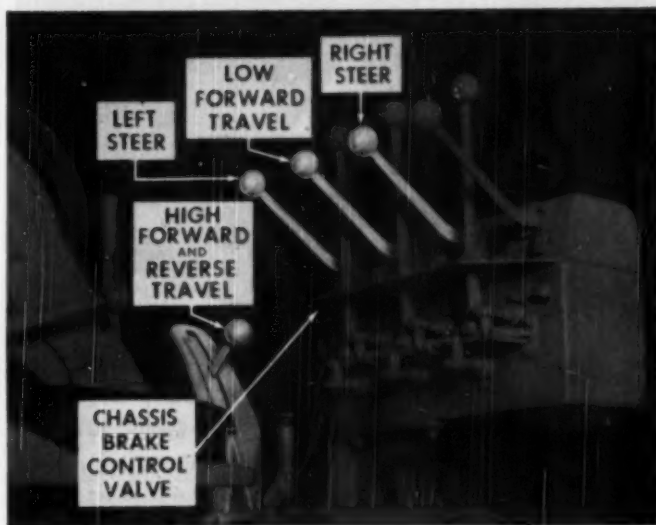


LOADING



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enables the BD-3 to handle bigger windrows. The exclusive Allis-Chalmers "Roll-Away" moldboard is a feature of the grader. The blade has a full 360° swing.

90

Berm Maintenance Tool: Gallon

A new grader attachment for filling ruts, washouts and holes in berms and reshaping the berm flush with the surface of the pavement, in one operation, was announced by The Gallon Iron Works & Mfg. Co., Gallon, O. The attachment consists of a deflector plate, a distributing or strike-off blade and connecting parts. It is attached to and works in conjunction with the motor grader moldboard and circle. The deflector plate lines up squarely with the front and rear wheels of the grader, and rides on and parallel with the edge of the pavement. The grader blade reshapes the uneven

berm. The excess material flows off the end of the grader blade against the deflector plate of the attachment, and passes on to the strike-off blade. The concentration of excess material in the corner of the deflector is said to assure a complete filling and reforming of the berm against the edge of the pavement. The angle of the strike-off blade, and the hinged section of the deflector plate to which it is attached, is adjustable to suit varying materials and operating conditions. The Gallon berm shaper attachment is designed for use with the Gallon No. 402 maintenance grader.

91

Motor Grader: Huber

A new heavy-duty motor grader was added to the line of road construction and maintenance equipment of Huber Manufacturing Co., Marion, O. Weight

of the new grader is 24,500 lb. without scarifier and 25,800 lb. with scarifier. Blade pressure without scarifier is 12,440 lb. and with scarifier, 14,630 lb. The scarifier attachment is offered as optional equipment. Overall length of the machine is 35 ft., 9½ in.; width is 7 ft. 10 in. and height with cab 10 ft. 4 in. The grader has eight speeds forward ranging from 1.31 to 20.63 miles per hour. There are two speeds reverse, 1.92-4.73 miles per hour.

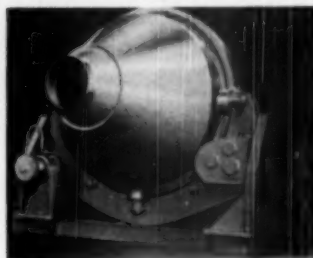
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Mixers

92

6-Yd. Concrete Mixer: T. L. Smith

To meet the demands of ready-mix plants and big construction projects, The T. L. Smith Co. of Milwaukee, Wis., designed and built a new 6 yd. tilter which is said to be the world's largest concrete mixer. Although the machine has low weight, as well as low overall height and length, it is said to be of unusually



sturdy construction. Features include: Automatic feed chute charging, "Tilt and Pour" discharge without segregation, complete control of discharge, all-welded support pedestals and tilting frame, 100 hp. electric motor direct connected to transmission by a splined shaft double universal joint, and push button or manual controls.

93

Concrete Mixing Plant: Mixermobile

Introduction of the 1 yd. Mixermobile, Model M-6, was announced by Mixermobile Manufacturers, Portland, Ore. The compact new model was designed to meet the need of contractors for a machine smaller than the 2 yd. Mixermobile. Model M-6, like its big predecessor, is a complete mobile concrete mixing and elevating plant. It has a hydraulically operated self-loading skip for receiving batched aggregate directly from dump trucks, portable batching plants, or front-end loaders. The unit has a standard 35 ft. steel tower, with 10 ft. exten-



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features:

- Self equalizing double arm lift, with heavy alloy steel castings for cross-heads and lift arms.
- Patented lift principle gives a low, uniform oil pressure.
- Sturdily built hoist sub-frame puts more life in your unit.
- All pumps equipped with needle bearings, precision built throughout.
- Safety feature in valve prevents accidental dropping of body.
- Special Marion feature permits mounting on right or left side without additional parts.
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sion available. Power is furnished by the truck motor, an 8-cylinder Ford industrial engine.

94

Tower Loader Attachment: Kwik-Mix

A special tower loader attachment for discharging concrete batches to forms above ground level or into trucks, announced by the Kwik-Mix Co., Fort Washington, Wis., can be fitted to either the Model 11-S or 16-S mixers. Maximum discharge height is 9 ft. 2 in. The bucket



handles a full batch directly from the discharge chute of the portable concrete mixer. Discharge at top of tower is completely automatic. Bucket travel and discharge is completed during the time the following batch is being mixed in the mixer drum. Operated by a special hoist, the loader is fully controlled by a single lever located on the operator's platform.

95

Attachment for Paver: Foote

A new rubber tired stone attachment for the Adnun black top paver was announced by The Foote Co., Inc., Nunda, N. Y. This device is made up of rubber tired wheels, carrying standard tires, which will replace the rollers under the rear of the Adnun which are supplied for laying black top. The rubber tired stone attachment should be used when laying stone or chips and it makes possible the development of the full effectiveness of the four-wheel drive design of the Adnun, eliminating slipping and giving greatly improved traction in laying stone and doing away with damage to rollers by pitting, which often occurs particularly when laying coarse stone. This device can be placed on any Adnun now in the field using the large steel rollers.

96

3-Yd. Portable Concrete Mixer

A new tilting type of concrete mixer, announced by Glenway Maxon, 757 N. Water St., Milwaukee 2, Wis., is claimed to have the following "firsts" in practical design: A 3 cu. yd. mixer which is portable. A 3 cu. yd. tilting mixer with gasoline, diesel or electric power at the option of the purchaser. High discharge; tilts up to discharge directly into bucket, dump truck or truck mixer. No compressed air required for operation. Consistency meter included. Other advantages claimed are: Controlled discharge—which starts or stops smoothly and quickly; improved mixing action—less grinding. Very ample overload rating; easy to clean and maintain; quickly set up for operation; designed to meet rigid engineering requirements.



Reaches Every Point in a 100' Circle!

Its 50' hose eliminates many changes of location, saves time and makes the hard-to-reach places easily accessible.

7 HP ENGINE—Loads of power for continuous operation, day in and day out. 4,000 to 7,000 VPM (instantly variable) with frequency and amplitude carefully balanced to give perfect compaction under all conditions. 2 1/4" vibrator head.

NO DAILY MAINTENANCE. All vibrator parts operate in stream of oil under pressure! **QUICKLY CONVERTED TO WET OR DRY GRINDING.** This machine will save its cost in short order.

FLEXIBLE-SHAFT VIBRATOR

Model FS-6A is the finest of the engine-driven, flexible-shaft type vibrators. Ample power (4 HP). Available with 3 heads for thick or thin sections. Shafting furnished in 7' to 14' lengths up to 25'. Grinding and other attachments. An excellent performer as proven on thousands of jobs.

MODEL FS-150A



IDEAL VIBRATORS FOR EVERY TYPE OF JOB:

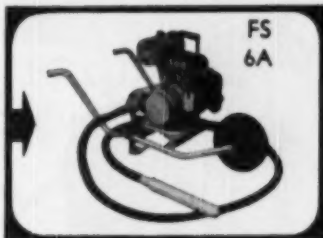
thin sections to mass construction — Highway, airport and municipal paving. Soil compaction. Portable Power Plants.

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Get your free copy of the Jackson "POCKET GUIDE", describing this equipment.

ELECTRIC TAMPER & EQUIPMENT CO. • Ludington, Michigan

Greater Time and Labor Savings, Greater Efficiency and Reliability Than Has Ever Before Been Provided In Any Concrete Vibrator for General Construction



FLEXIBLE-SHAFT, ELECTRIC VIBRATOR

2 1/4 HP motor. Plenty of power to handle the stiffest mixes with the maximum length of shaft (25'). Operates from light socket, 115 volt, single phase AC or DC. 8,000 to 10,000 VPM. Available with 3 vibrator heads and any length of shaft up to 25'; attachments for quick conversion to wet or dry concrete rubbing. Highly convenient, weighs only 50 lbs.

97

Portable Concrete Plant: Erie

An auxiliary hoist, hydraulically operated by the plant operator, was added to the portable concrete plant of the Erie Steel Construction Co., Erie, Pa. The hoist raises and lowers a concrete bucket which takes a complete batch of concrete from the Erie plant, thus permitting the next batch to be cycled with little delay. It is conservatively estimated that with this hoist concrete output is increased at least 25% in the Erie Plant. Another advantage resulting is the ability to raise each batch of concrete to any desired height.

98

Plaster-Mortar Mixer: Kwik-Mix

A new 10 cu. ft. plaster-mortar mixer, designed to meet high volume production demands of contractors on large construction projects, was introduced by Kwik-Mix Co., Port Washington, Wis. Mounted on two wheels with extra wide treads for fast, easy towing, the new mixer is a non-tilt, end discharge type. The mixer has a low charging height of 46 in. In addition, non-clogging mixing blades in the drum are arranged for radial and longitudinal adjustment and produce end-to-end mixing action and rapid discharge. Blades are set to scour drum with each revolution.

99

Paver Boom: Foote

A new HighLift boom was made available for both the Singlemix 34-E (single drum) and Duomix 34-E (double drum) Multifonte concrete pavers of the Foote

Co., Inc., Nunda, N. Y. This boom can be controlled from the operator's platform and held in any position above the ground with a vertical lift of 23 feet bucket clearance. This allows the paver to be used in a wide variety of work such as parapets, bridge abutments, retaining walls and footings and walls for general building construction. The HighLift boom will work flat and in many cases, permits working under steel structures where equipment with longer booms would find difficulty.

100

Water Tank for Paver: Foote

A new water tank for its Duomix (dual drum) 34-E MultiFoote concrete paver was announced by The Foote Co., Nunda, N. Y., subsidiary of Blaw-Knox Co. This tank is mounted on the side of the machine opposite the operator's platform with the other equipment making up the main water system. The tank will carry 650 gal. of water over and above the normal water supply of 210 gal. and provides plenty of capacity between tank wagon trips to avoid shutting down. Equipment includes a pump for handling water from wagon to tank.

101

3 1/2-S Mixer: Muller

A new 3 1/2-S end discharge, non-tilting mixer, equipped with a power loader and automatic water measuring tank, was announced by Muller Machinery Co., Metuchen, N. J. The machine is equipped with a large skip with a wide throat. The mixer permits dumping from wheelbarrows directly into the loading skip, eliminating the necessity of high shovelling into the batch hopper.

102

Bucket Controls for Paver: Foote

New bucket controls for the Multi-Foote paver were announced by The Foote Co., Nunda, N. Y., subsidiary of Blaw-Knox Co. These controls are designed to be used with the bucket on the Multi Foote highlift boom and are mounted on the bucket itself. They permit the smooth operation of the bucket doors for any degree of opening, allowing the delivery of anything from a shovelful to the full bucket load of concrete. It is stated that the man spotting the bucket can thereby deliver the desired amount of material with an accuracy that is impossible where control must be done from the paver deck.

103

Electric Paving Breaker: Homelite

A paving breaker announced by the Homelite Corporation, Port Chester, N. Y., is operated by electricity rather than by compressed air. Electricity to operate this breaker is supplied by a 129-lb. dual voltage gasoline-engine-driven generator which can be used for operating other types of high-cycle tools as well as standard 110-volt tools and floodlights.

**Additional items in 1949
Equipment Review to appear in next month's Roads
and Streets covering Bituminous
Equipment and Miscellaneous.**



BIGGER PAYLOADS

with **WELLMAN**

Williams Type **BUCKETS**

• Exclusive features in design and construction make payloads bigger... at lower cost! Weight is balanced, not cumbersome. Extra strength is built into every part with the sturdy welded rolled steel construction pioneered by Wellman, the leader for over fifty years. A type for every service!

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7003 CENTRAL AVENUE • CLEVELAND 4, OHIO



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BULLETIN

New and Improved Construction Products

As Currently Announced Since the First of the Year

104

Crushing and Screening Plant

Known as the Hawkeye Series, the new line of Cedarapids crushing and screening plants, brought out by Iowa Manufacturing Co., Cedar Rapids, Ia., is designed to produce low cost gravel for road maintenance and small concrete structure jobs. Economies in manufacture through simplified design and volume production of standard component parts enable the manufacturer to offer models in this series at a low initial price. The lightweight Hawkeye plant is 100% portable, with nothing to set up or take down when transporting, and can be moved with the job to the nearest gravel bank to eliminate high hauling costs. Depending on local conditions and specifications required, the plant produces be-



Hawkeye Crushing and Screening Plant

tween 50 and 75 tons of accurately sized material per hour. The Hawkeye is an all-in-one unit made up of standard Cedarapids parts consisting of hopper,

feeder and feed conveyor; Cedarapids horizontal vibrating screen; bucket elevator and return conveyor; sand and delivery conveyors; and a choice of four sizes of either plain or roller bearing jaw crushers, 10" x 16", 10" x 20", 10" x 24", or a 12" x 16" twin jaw crusher.

Complete information can be obtained from the company or by circling No. 104 on post card at page 74.

105

All-Purpose Hydraulic Coupler

A new all-purpose "Ulrix" hydraulic coupler announced by the Ulrich Mfg. Co., Rosnoke, Ill., is applicable both to installations where a breakaway type coupler is required as well as those where a standard type is indicated. When the plug is inserted into the socket, a slight twist causes a sleeve to automa-



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Then Compare
and See the Difference

TERRAPAC

The Vibro-Plus TERRAPAC Soil-Compactor will give 95% compaction down to a depth of 3 1/2 feet.

The job tested TERRAPAC has proven its value in road work, airports, and back fill compaction.

- Self propelled or tractor drawn
- One man operation
- 2 1/2 gallons of diesel fuel consumption per day

ROLLOGEAR "INTERNAL VIBRATOR"

Nc. Other Vibrator But Rollogear Has:

- High frequency (15,000) V.P.M.
- Flexible shaft speed of only 3600 R.P.M.
- A direct snap coupling between engine and shaft. NO TOOLS NEEDED

TOPDOG "EXTERNAL VIBRATOR"

- Lighter in weight with a heavier kick than ANY OTHER VIBRATOR
- Can save more than 75% of form costs
- 6 month guarantee
- Saving of a bag of cement per cubic yard of concrete
- Besides being used on all types of concrete forms, it can be used on chutes, vibrating tables, etc.



To insure a superior concrete product utilize Vibro-Plus equipment and know-how.

Consult us about your particular problem in vibration. A trained force will be at your disposal to assist you in every way.

DEALERS:

Your inquiries will receive prompt attention.

VIBRO-PLUS PRODUCTS, INC.

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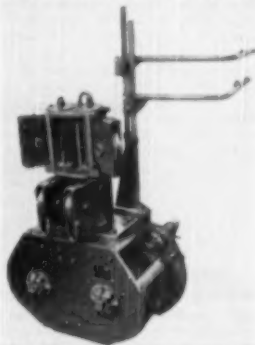
tically lock the coupler. Disconnect is accomplished by pulling the sleeve back. This is the standard coupler application. To use as a breakaway coupler, the sleeve is connected to the tractor by means of a bracket. When a piece of equipment breaks loose from the tractor, the bracket pulls back the sleeve and disengages the coupler automatically, preventing hose breakage and oil loss. The new all-purpose coupler can be connected under all operating pressures. When disconnected from a raised load, the coupler is said to hold the pressure of the load as long as required.

Further information can be obtained from the manufacturer, or by circling No. 105 on post card at page 74.

106 Power Control Units

A new line of power control units being offered by Kay-Brunner Steel Products, Inc., Los Angeles, Calif., is designed for every crawler tractor and for every cable control use. The line includes 3 models, Model C-90D, double drum, for tractors of 50 hp and up; Model C-50D, double drum, for tractors up to 50 hp; and a Model C-50S, single drum, for tractors up to 50 hp. A special unit, known as the Model C-90DL, for logging and extra heavy duty work, features extra heavy duty clutch and cone, and special drum and control guards for added protection. Features include alloy, heat-

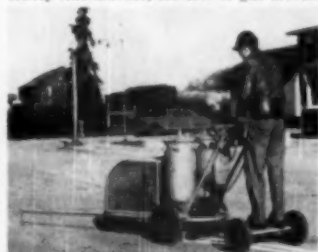
treated cast steel cases and covers; heat-treated, alloy steel gears; roller or ball bearings on all turning parts; high-strength, alloy cast iron clutch and brake drums; cone-type clutch; gear ratios from 5 to 1, up to 12 to 1; swinging fair-



Model C-50D Power Control Unit leads on Models C-90D and C-50D, and adjustable control levers. Any unit can be dis-assembled or assembled in the field, without block-and-tackle or hoist. Bulletin 364-ED can be obtained from the company or by circling No. 106 on post card at page 74.

107 Traffic Line Markers

An entirely new line of street, highway and industrial markers has been introduced by Meili-Blumberg Corporation, New Holstein, Wis. The line includes the super 10 self-contained, self-propelled highway marker, powered by a Wisconsin Model TF Engine, for striping all types of traffic lines; the super 4 self-propelled safety-line street marker; and the No. 5 safety-line marker, electric or gas driven.



Super 4 Self-Propelled Safety-Line Street Marker striping a double center line. Note operator rides on trailer which hitches behind Marker.

for street or industrial plant striping, or spray painting. All street and highway models are available with head dispenser attachment, if desired.

Literature or photo prints can be obtained from the company or by circling No. 107 on post card at page 74.

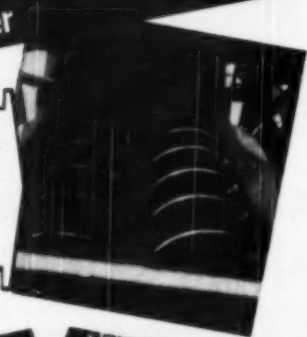
108 New Line Bulldozers

A complete new line of Baker bulldozers and graders built for Allis-Chalmers HD-5 tractors has been placed in production by Baker Mfg. Co., Springfield, Ill. These are hydraulic controlled through twin hydraulic cylinders mounted at the front of the engine frame. Overhead height of the mounting is less than for the tractor itself. Other significant features are direct lift with a

WRING MORE PROFITS FROM GRAVEL

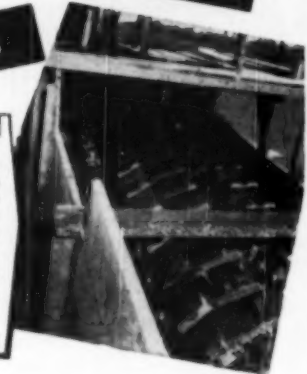
with Eagle Coarse Material Washer

Deposits contaminated with clay, loam and silt can be worked profitably with an Eagle Coarse Material Washer. Material is "rubbed and scrubbed," by the screw flights loosening foreign matter which is floated up and out of the tub by rising currents. Clean gravel goes up and onto the belt, clean and de-watered. An Eagle Washer-De-waterer quickly returned its cost for this Illinois producer.



or Eagle Log Washers

For stubborn cases — cemented aggregates, tough clay balls, soft stone admixtures — Eagle Log Washers are recommended. Often used in conjunction with an Eagle Washer — Classifier-Dehydrator on the sand. Paddles with replaceable, corrugated shoes chop through gummed up material — clay and debris are washed up and out and gravel free of clay goes to gradation, screen or bin. Send a sample from your deposit for analysis and recommendations. Ask for Catalog 47.



SAND AND GRAVEL EQUIPMENT
"Trinital" Dodge Loaders
Screen Washers — Log Washers
Dehydrators — Sand Tanks — Classifiers

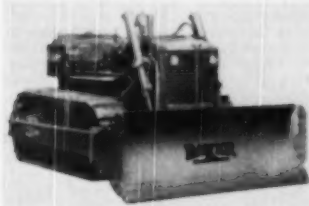


EAGLE IRON WORKS

179 HOLCOMB AVE.,

DES MOINES, IOWA

minimum of working and wearing parts; positive down-pressure; comfortable, sensitive finger-tip control; full freedom for servicing tractor engine without removing bulldozer mounting; rolling-action blade shape; chrome plated piston rods to prolong life of rods and pack-



New Bater Bulldozer

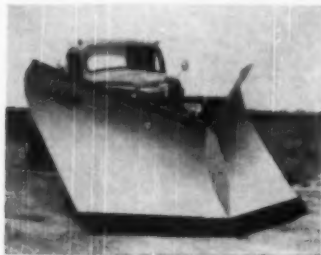
ings; reliable fully protected front-mounted pump. Both bulldozer and grader are available for standard and also wide gauge Allis-Chalmers HD-5 tractors.

Catalog and full details can be obtained from the manufacturer or by circling No. 108 on post card at page 74.

109

V-Type Snow Plow

A new V-type snow plow brought out by Jarp Corporation, Wausau, Wis. It has all-welded construction, alloy steel moldboards to increase strength and reduce weight, and smooth rolled moldboards for fast discharge with minimum resistance. The moldboard curvatures



Jarp Snow Plow

are designed by experts to provide an all-purpose plow. "V's" one way rigid, one way trip and reversible model are available for all trucks from $\frac{1}{2}$ to 5 ton capacity.

Further information can be obtained from the company, or by circling No. 109 on postcard at page 74.

110

Air-Entraining Agent

A new and improved air-entraining agent, Protex, has been developed by the Industrial Research Department of Autolene Lubricants Co. of Denver, Colorado. The product will not settle out and assures uniform results, eliminating operating difficulties. It is a liquid which, when added to the concrete mix, entrains millions of near-microscopic, non-combining air bubbles. Claims for the new product include: Reduces bleeding and segregation of aggregates, expedites and shortens the time of finishing operations, facilitates vibration, improves placability, permits hauling without agitation.

A free book, "Facts on Modern Placement of Concrete Through Air-Entrainment," is available from the company or can be obtained by circling No. 110 on post card at page 74.

NEW GIANT ALLOY adjustable wrenches

REPLACE 29 SIZES

THINNER • LIGHTER
STRONGER



New for the first time quality, light-weight, alloy steel adjustable wrenches drop-forged to stand up under heavy duty jobs. The OTC Slim Twin make tough jobs easy - save tool and time costs - result in faster, more productive work in your shop or on emergency calls. The OTC Slim Twin Wrenches replace 29 standard size wrenches.

OA-24 is 24" long, 7/8" thick and weighs only 10 lbs. Adjusts to 13 standard sizes from 1-3/8" to 2-7/8". OA-36 is 36" long, 1-1/8" thick and weighs only 22 lbs. Adjusts to 16 standard sizes from 2-15/16" to 4-3/4".



PATENT
APPLIED
FOR



OWATONNA TOOL COMPANY

4th CEDAR STREET, OWATONNA, MINN.



Sauerman Stacking Cableway digs gravel from lake and delivers 75 cu. yd. an hour to plant at cost of few cents a yard.



Sauerman Trestle Cableway of simple type is a profitable tool for handling materials on bridge construction and similar jobs.

Handle Material Faster, Cheaper

with a

SAUERMAN MACHINE

SPEED is the great need of these busy times and that is what you are assured at minimum expense when you use a Sauerman Cableway or Scraper machine for your long range earthmoving jobs.

A Sauerman machine can be installed to reach across a pit, pond, river or stockpile or up to the top of a hill and will move material at high speed from one point to another anywhere within its wide radius of operation—entirely under control of one operator.

"The Sauerman Way is the Modern Way"

WRITE FOR
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SAUERMAN BROS., INC.

588 S. Clinton St., Chicago 7, Ill.



EFFICIENCY Goes UP ... COSTS Go DOWN

When this
**WISCONSIN-
POWERED**

"KAL-TRUK" Goes to Work!

Handling cement the modern way . . . speeds up hauling and schedules . . . and reduces labor, as shown by this Kalamazoo Mfg. Co., $\frac{1}{2}$ cu. yard capacity "Kal-Truk", powered by a 2-cylinder Wisconsin Heavy-Duty Air-Cooled Engine.

Respect and recognition of Wisconsin Engine superiority is shared equally by manufacturer and user . . . both of whom know that better machines depend on better engines . . . that better engines are a result of such superior features as Timken tapered roller bearings at both ends of the shaft, taking up all thrusts . . . fool-proof air-cooling, sub-zero to 140° . . . a rotary type OUTSIDE magнето for easy servicing with impulse coupling, assuring fastest, all-weather starts . . . jet and spray oiling . . . plus heavy-duty construction inside and out. Write for information! 4-cycle, single-cylinder, 2-cylinder, and V-type 4-cylinder models, 3 to 30 hp.



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14, WISCONSIN

Advanced TILT-DECKS by ROGERS

CAPACITIES

5
TON

7
TON

9
TON

11
TON

14
TON



Featuring
**HYDRAULIC
CUSHIONING
OF DECK**

Through repeated satisfactory experiences users have come to expect greater value in Rogers trailers; and they get it assuredly in these new tilt deck models.

They embody extra strength — easier loading — improved haulability and absolutely reliable braking.

But the new feature appreciated by all, is the hydraulic ram which controls and cushions the deck movement when loading or unloading heavy equipment.

There are sizes for all needs in three types — two wheel on a single axle — four wheel on tandem axles — and four dual tire wheels on tandem axles.

Write for literature and learn how these trailers can effect savings in hauling many kinds of equipment — faster and more economically.

ROGERS TRAILERS

EXPERIENCE builds 'em

PERFORMANCE sells 'em

ROGERS BROTHERS CORPORATION, 108 Orchard St., ALBION, PA.

111

Steel Drum Winch

A new drag brake winch placed on the market by The Adams Engineering Co., Cleveland, O., designed to handle safely a working load up to 18,000 lb. has all heavily stressed castings made of electric furnace steel. The drum drive shaft is of "stressproof" steel and is capable of absorbing any sudden power stresses. All operating levers are steel forgings. To give extra protection against shocks



Model M-18-DE Adoloy Winch

and heavy loads, the winch has a large pitch worm and gear. One feature of this winch is the improved drag brake and clutch assembly. The hardened steel dent is claimed to assure positive engagement of the clutch which is self locking. An important feature is the flush type cable clamp. After the cable is fastened the face of the clamp is flush with the surface of the drum.

Further information can be obtained from the company or by circling No. 111 on post card at page 74.

112

Power Post Hole Digger

A self-contained, self-powered, portable posthole digger, weighing less than 100 lb., has been announced by the Choremaster Division of The Lodge & Shipley Co., Cincinnati, O. The digger has a $1\frac{1}{2}$ hp engine which powers a heavy-duty 9 in. alloy steel auger. A centrifugal clutch provides finger tip control. The auger



Power Post Hole Digger

has replaceable hardened cutting edges and is available in a 36 in. length at present. A variety of other sized augers are planned. The unit is equipped with anti-friction bearings throughout.

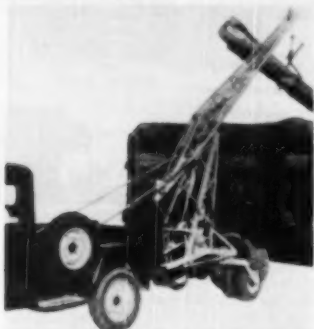
Further information can be obtained from the manufacturer or by circling No. 112 on post card at page 74.

113

Cradle Boom Hoist

A new cradle boom Handi-Hoist now in production by the Lathers Manufacturing Co., Madison, Wis., is a completely portable unit which can be towed at speeds of 60 miles or more with any ordinary car. The hoist itself clears 18 ft. in height and the boom will reach out 10 to 12 ft. from the "A" frame of the hoist. It is completely mobile and can be moved about with heavy loads suspended in air. No blocks are necessary. The hoist has a patented "hook-up" feature which uses the entire weight of the truck or tractor

for counter balance. Wheels can be locked in forward position or allowed to swivel for small space turning and maneuvering. Lifting capacity of the cradle boom Handi-Hoist is rated at 6000 lb. Boom can be set at any angle desired. The hoist can be attached to any make tractor or Willys Jeep. It operates from



Logging Model Cradle Boom Handi-Hoist
power take-off. It can be detached in ten minutes by removing two bolts and unhooking two boom chains.

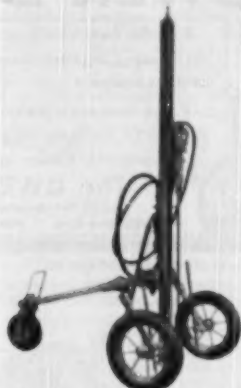
Further information can be obtained from the company or by circling No. 113 on post card at page 74.

114

Light Wagon Drill

A new G-150 light weight wagon mounting, announced by Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y., was developed for handling sinker drills of the 55 lb. class or 3 in. drifters. Designed for increased footage, in one-man operation, the features claimed for the G-150 include:

Longer steel changes—6 ft., materially increases actual throttle time. No operator fatigue—newly developed feed motor does the work. Powered steel puller eliminates wrenching of steel and loss of



New G-150 Light Weight Wagon Mounting
holes in hard drilling ground. Positive and uniform feeding pressure promotes faster unit drilling speed with lower air consumption per foot drilled. Universal type saddle, adjustable laterally on the crossbar, assures quick positioning for drilling at any angle. A sliding cone allows adjustment for uneven ground conditions. Ball bearing wheels with pneumatic tires make moving easy.

Bulletin SP-3010 giving further information can be obtained from the company, or by circling No. 114 on post card at page 74.

115

New Design Chipping Hammers

A line of chipping hammers based on a new design to meet the exacting cutting conditions imposed by present-day metals has been announced by Ingersoll-Rand Co., 11 Broadway, New York, N. Y. Known as the controlled power chipping hammer line, it has an exceptional performance range and offers a selection of 15 power sizes (with 3 basic hammer sizes) to meet the requirements of every job. Each basic hammer size is available in normal-cut, extra-cut, or supercut type,



Controlled Power Chipping Hammer

which is made possible by a design variation in one part interchangeable throughout the whole line.

Further information can be obtained from the company, or by circling No. 115 on post card at page 74.

RUEMELIN *Portable* SAND BLAST GENERATORS

FOR CLEANING BRIDGES — WATER TOWERS — STRUCTURAL STEEL

Many contractors use Ruemelin Blast Generators for cleaning steel work to remove rust, paint and scale before repainting. These machines are also used to remove laitance from cement wherever concrete construction is in progress. A wet adapting nozzle can be furnished to convert dry machines to wet type of operation.



Ruemelin Generators are built in several sizes, 400 lb. to 10,000 lb. capacity. Single or two hose outlets. We can care for your complete requirements, including blast hose, tungsten nozzles, operators' helmets.

Agents in principal cities. Prompt shipment on most sizes. Write for Bulletin 26-B.

RUEMELIN MANUFACTURING CO.

2990 N. PALMER ST.

MILWAUKEE 12, WIS., U.S.A.

Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT. WELDING FUME COLLECTORS

FASTER SNOW REMOVAL EASIER HANDLING LONGER SERVICE FRINK MULTI-FEATURE SNO-PLOW

Every one of Frink's 15 snow plows is scientifically engineered for faster snow removal in any area... ruggedly built for more hours of continuous service... economically priced for any city, county, or state budget.

Frink Sno-Plows are available for trucks with capacities from 1½ to 12 tons. For further information about the plow best suited for your needs, write Box P51W, Clayton, New York.

For further information about the plow best suited for your needs, write Box P51W, Clayton, New York.



FRINK SNO-PLOWS, INC. CLAYTON, NEW YORK

DAVENPORT-BISLER CORP., DAVENPORT, IOWA

FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.



1. Self ballasting
2. Full power hydraulic control
3. Height of cutting edge adjusted without tools
4. Reversible cutting edges for double use
5. Hinged deflectors to keep flying snow off windshield
6. Side-leveling wings if desired

The Man In the Crane Prefers "AN OWEN BUCKET"



Like the head on a hammer, the proper bucket on the crane assures maximum operating efficiency of the machine.

Crane operators prefer working with OWEN BUCKETS. For faster digging, discharge and ease of handling, Owen Buckets are unexcelled.

The OWEN BUCKET Co.

6070 Brookwater Avenue, Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.



A MOUTHFUL
AT
EVERY BITE



116

Metering Dispenser for "Banox"

A metering dispenser for adding the recommended amount of the rust inhibitor "Banox" to salt has been announced by the Tarrant Manufacturing Co., Saratoga Springs, N. Y. Designed for use as an attachment to the company's "Scotchman" Chemical Spreader, the new dispenser permits addition of Banox in the proper amount while the truck carrying the spreader is in operation. The dispenser has a capacity of 23 lb. of Banox.



Close-up of Banox Dispenser (Dart Hopper) above

It is made of painted steel, with stainless steel valve. A cover on the hopper protects the rust inhibitor between uses. The new dispenser is demountable and may be removed easily and quickly when the "Scotchman" chemical spreader is to be used for dispensing materials other than de-icing salt.

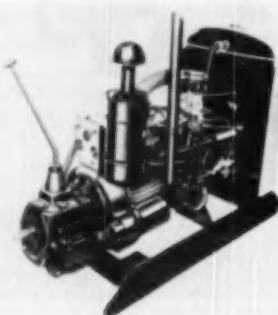
Further information can be obtained from the company, or by circling No. 116 on the post card at page 74.

117

Power Units

A complete new line of Ford industrial power units went into production in January at the industrial engine department of Ford Motor Co., Dearborn, Mich. Five models are included in the line and are available in either open or enclosed versions. They will be offered complete with radiator, instrument panel and S.A.E. or Ford type housings, and will be equipped with skid type mountings. The units may be ordered with or without clutch, power-take-off and 3-, 4- or 5-speed transmissions. Each unit, either open or closed, will be thoroughly tested in manufacturing and will be ready to run immediately upon installation. The industrial engine power unit line includes two 6-cylinder models, two V-type 8-cylinder models and one of four cylinders. Piston displacement

of the 4-cylinder unit is 129 cu. in.; 226 and 354 cu. in. in the 6-cylinder models.



New Open Type Ford Industrial Engine Power Unit

els and 239 and 337 cu. in. in the 8-cylinder models.

Further information can be obtained from the manufacturer, or by circling No. 117 on post card at page 74.

118

Lift Capacity Ratings Increased

An increase in lift capacity ratings was recently announced by the Koehring Co., Milwaukee, Wis., for three sizes of excavators currently produced by the firm. In published specification charts, maximum capacity of the Model 304 Koehring excavator has been established at 13.9 tons with crawler mounting and 25 tons on both the rubber tire mounted truck and crawler cranes. The new specifications also show an increase for the crawler mounted Model 805 machine which is now listed at 36 tons. The lifting capacity of the Model 1006, latest addition to the Koehring line of heavy-duty excavators, has been tabulated at 79½ tons maximum.

Copies of the new specification charts may be obtained from the company, or by circling No. 118 on post card at page 74.

119

Low Cost Portable Crushing Plant

The Cedarapids single pass plant, a new crushing and screening plant announced by Iowa Manufacturing Co., Cedar Rapids, Ia., is made up of standard Cedarapids units and has been especially designed as a low investment machine for moderate sized crushing jobs. Rec-

ommended for use where the material is screened into only one size, the highly mobile single pass plant can be set up close to the job-site to eliminate high hauling costs and provide a source of low cost gravel and rock for road maintenance work or small construction jobs.



Cedar Rapids Single Pass Plant

Extremely low operating costs and plant maintenance are claimed to be the result of simple design. The single pass plant consists of a reciprocating, clutch controlled feeder and a 6' x 6' charging hopper with adjustable feed gate; a Cedarapids single deck horizontal vibrator screen, 24" x 3'; a Cedarapids jaw crusher, with 10" x 16", 10" x 20" or 10" x 24" jaw opening; (plain or roller bearing); and a 25' delivery conveyor. All units are mounted on a steel wheeled or pneumatic tired truck.

Complete details may be obtained from the company or by circling No. 119 on post card at page 74.

120

Low-Price Snow Plow

Introduction of a new low-price snow plow which will double in summer as a light bulldozer has been made by James Cunningham Son & Co., Rochester, N. Y. Powered by a 1½ hp 4-cycle gasoline engine, the new plow's heavy gauge blade clears a 40-in. path and is easily angled by an instantly located handle bar lever. It is equipped with 4.00 x 12 rubber tractor tires.

Further information can be obtained from this company or by circling No. 120 on post card at page 74.

121

1950 Ford Trucks

Featured in the new 1950 Ford truck models, now on display by Ford dealers, are 21 engineering, design and manufacturing advancements contributing to more efficient, economical performance and lower maintenance cost. Special at-



1950 Model Series F-8 Tractor with Tandem Rear Axle Semi-Trailer

tention has been paid to engineering improvements contributing to longer life. The 1950 models are powered by the 226 cu. in., 95 hp 6 cylinder Ford truck engine; the 239 cu. in., 100 hp V-8; the 337 cu. in., 145 hp V-8 and a recently developed 254 cu. in., 110 hp six. This engine used in the F-6 series is the most powerful 6-cylinder engine ever built by Ford. Outstanding features of the 1950 models include 15" x 5" rear brakes with aluminum shoes on F-7 models. Full air brakes of the 2-shoe type are now available for F-8 series models. Gross vehicle weight ratings for the 1950 line range from 4,700 lb. in the F-1 to 22,000 lb. in the F-8 straight truck and 39,000 lb. when used with tractor and trailer.

Further information can be obtained from the manufacturer or by circling No. 121 on prepaid post card at page 74.

122 Screed Supports

A complete line of screed supports for all conditions of light or heavy screeding is now available from Richmond Screw Anchor Co., Inc., 818 Liberty Ave., Brooklyn 8, New York. New additions to the

line include the offset screed head designed to hold either a 1 in. I.D. Pipe or a 1 1/4 x 1 1/4 x 3/16 in. T Bar. This head is completely adjustable from above by means of a speed wrench. Other new items are the screed bolt for heavy screeding with a 2 in. x 2 in. x 1/4 in. T Bar (also adjustable from above), the form bracket, adjustable base, sub-grade stake, sub-grade base, sub-grade chair, form bolt, and curb bolt. The latter two are used for supporting hanging forms for walls or curbs.

A 4-page bulletin describing the complete line is available from the company or can be obtained by circling No. 122 on post card at page 74.

123 Hydropel Developed to Waterproof Concrete

Hydropel, a development of the Stancal Asphalt and Bitumuls Co., is a product designed to overcome basic difficulties caused by the moisture to exposed concrete. Some of these difficulties, as explained by manufacturer, are perviousness, volume changes caused by water absorption, increased disruptive tensile stresses due to absorption, desintegration from weathering, disruptive action of freezing and thawing.

Hydropel is claimed to (1) reduce capillary absorption by 75 to 85%, (2) fully resist the action of alkaline or neutral salts and is effective against chemical gases, (3) eliminate internal stresses due to volume changes from alternate wetting and drying, (4) prevent damage caused by freezing and thawing, (5) cushion impact and add toughness to piles or structures subject to driving or to vibrational stresses, (6) avoid segregation and improve workability, and others. It is a brown, slightly viscous liquid, recommended as an admixture to portland cement concrete at the rate of 1 1/2 gal. for each sack of cement. There is no serious impairment of total strength and even aids strength in lean mixtures.

Details are available without cost in Technical Papers prepared by engineers and published by the Stancal Asphalt and Bitumuls Company, 200 Bush Street, San Francisco, Calif. Please mention ROADS AND STREETS when writing for information.

CAA Issues Annual Report of Airport Act

The Fourth Annual Report of the Federal Airport Act, prepared annually by the CAA for submission to

the Congress, covers all phases of work accomplished under the Federal Airport Program through the fiscal year ending June 30, 1949.

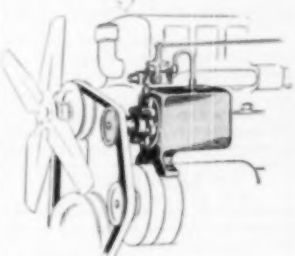
It lists total Federal expenditures for airport construction and development as being \$35,500,000 of which \$20,404,923 was for 345 completed projects. Grant agreements, where local sponsors have accepted grant offers for Federal aid on specific projects, numbered 765 for \$78,266,664 in Federal funds for work on 630 airports. The \$78,266,664 figure represents approximately 76% of the \$103,774,079 in Federal funds which has been allocated.

Copies of the Fourth Annual Report of the Federal Airport Act available from the CAA Office of Aviation Information, Washington 25, D.C.

Kentucky Buys 959 New Equipment Units

The Kentucky State Highway Department, during 1949, purchased 959 new units of highway maintenance equipment of all types at a cost of in excess of \$2,500,000. According to equipment director W. A. Tinker, 805 old or obsolete units were either junked or sold off. This department also added to its garage facilities during the year.

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Loma model 502 2 yd. Diesel Dragline.
Boycroft-Erie model 38-6 Diesel Dragline.
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Ray-City ¾ yd. Buckham.
Caterpillar model 2-B-10 Tractor 41-100.

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- 1—Buffalo Springfield 10-ton 3 wheel Roller, gas power, good operating cond. \$1500.00
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- 1—Littleford Heating Kettle "61-HD," size 22 1/2, 225 gals. cap., mtd. on 2 pns. tires, w/gas. eng. for power spraying, w/1/2 fl. of installed hose, NEW. \$750.00
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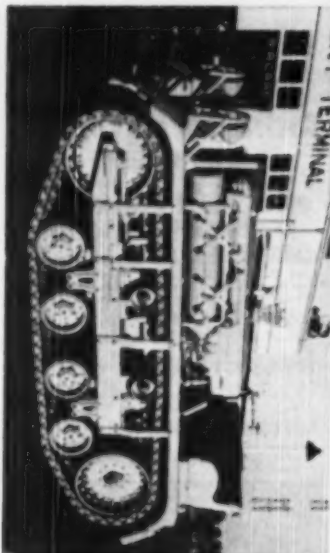
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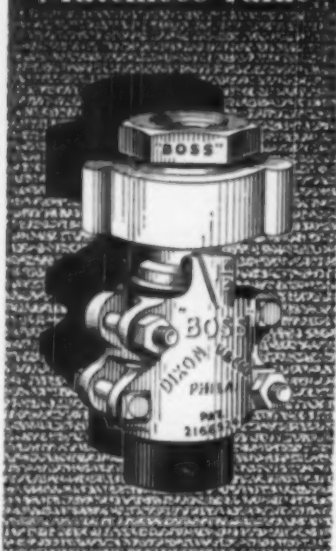
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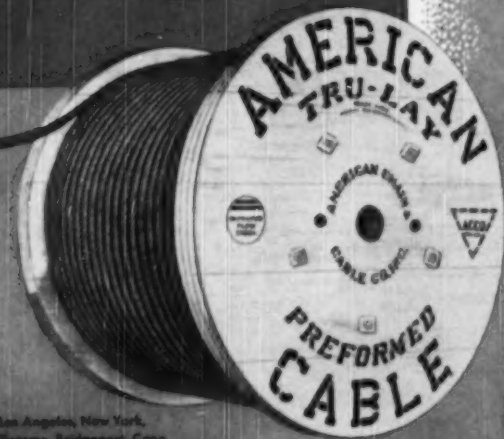
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